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CONTENTS

EDITORIAL

Ethical Issues in Pediatric Surgery

NC Bhattacharyya 01-02

REVIEW PAPER

Faculty Development in Medical Education: Where Do We Stand in Assam?

Barua Purnima, Debajit Hazarika 03-07

Revisiting Pre Anaesthetics Evaluation: A Review

Gogoi Rahul, Bora Neelutpal, Roy Bhabotosh Kumar, Baruah Nabanita 08-012

ORIGINAL PAPER

Effect of Octreotide in Reducing the Serum Amylase and Lipase Levels on Patients with Acute Pancreatitis

Ganguly Narendra N, Bhattacharjee Nilutpal, Choudhury Purujit, Rathi Rohit, Deka Nilotpal 13-17

Chronic Kidney Disease with Special Reference to Dyslipidemia

Sharma Manjuri, Baruah Swaroop Kr, Teron Mithu, Das Himanab Jyoti 18-23

Value of AgNOR, in Malignant Lesions of Cervix

Sonowal Basanta, Handique Amitabh 24-28

Frontal Skull-Base Meningioma: Its Management and Outcome

Baishya BK, Talukdar Ramen, Barman Paran 29-33

Seroprevalence of Hepatitis D Virus in Patients with Hepatitis B Virus-Related Liver Diseases

Biswas Samrat, Das Dipak Kumar, Barua Nitin, Hazarika Naba Kumar 34-37

A Clinical Study of Arthroscopic Management of Meniscal Injuries of Knee Joint

Paul Gautam Chandra, Biswas Samrat, Das SK, Sipani AK 38-42

High Frequency Ultrasound and Color Doppler Evaluation of Carotid Artery

Atherosclerosis in Hypertensive Patients Compared with Normotensives

Dutta Parul, Paul Sudip 43-49

A Study of Socio-Demographic Profile of Persons Accused Under POCSO Act 2012

Chowdhuri Soumeek, Mukhopadhyay Parthapratim 50-55

Cheiloscopy as a Tool for Identification

Medhi Shobhana, Deka Rup Sekhar 56-62

Knowledge, Attitude and Practice of Self Medication Among Nurses and Midwives of a Tertiary Care Hospital

Phukan Swopna, Singha Binita 63-66

Serum Uric Acid in Hypertension and Cerebrovascular Accident

Devi Jilimili, Begum Bilkish 67-71

Endoscopic Management of Foreign Bodies in the Airways and Esophagus of Children

Goswami Jayanta Kumar 72-76

Morphological Study of Human Spleen in Different Age Groups

Deka Himamoni, Deka Rup Sekhar, Das T K, Talukdar KL 77-81

A Study on Gallstone Disease in Relation to Different Ages

Rajbangshi Madhab Chandra, Deka Sumi 82-85

A Study of Asphyxial Death Cases in Medico-Legal Autopsy

Gupta Ved Prakash, Mahanta Putul 86-89

Factors Associated with Stress Among B.Sc. Nursing Students

Deka Meghali 90-94

A Study of Antioxidant Levels in Patients with Diabetes Mellitus

Das Monigopa, Bora Keshab 95-100

A Study on Length of Human Appendix in Different Ages

Hazarika Bornali, Deka Rup Sekhar 101-106

Evaluation of Management of Organophosphorus Toxicity in Tripoli City Hospitals (Libya)

and that in Minia University Hospital (Egypt)

Khaled M. Gdarah Basheer A. Belkhair, Osama A. Hassan, Mahmoud S. Annajar, Nouri M. Elmiladi 107-111

A Comparative Study of the Survivors and Non-Survivors of Acute Respiratory Distress Syndrome

Devee Anjana, Hasan Jehbi 112-117

Role of Paperless Partograph in Monitoring Primiparous and Multiparous Labour

Deka Gitanjali, Sharma Rajashree, Das Gokul Chandra 118-121

Role of Tila Taila as Sneha Abhyanga in Sandhigatavat in Relation to Pain to Prove the Theory "Snehat Vatam Samayati"

Kalita Upen, Deka Himamoni, Mahanta Neelakshi 122-125

A study on 'sero-prevalence of rubella in pregnancy' giving special emphasis to its clinical presentation

Das Dipak Kumar, Biswas Samrat 126-129

CASE REPORT

Minimally Invasive Beating Heart Mitral Valve Surgery

Kalita Jyoti Prasad, Ahangar AG, Saikia Manuj Kumar, Yunus Md, Kapoor Manish 130-133

A Rare Case Report of Extra Medullary Hematopoiesis in Lung in a Case of Thalassemia

Ghosh Sumana, Nath Sanjay, Islam Habibul 134-137

Cut Throat Injury: Homicidal or Suicidal? Crime Scene Visit Solved the Mystery

Waghmare PB, Bhise SS, Nanandkar SD 138-140

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EDITORIAL

Ethical Issues in Pediatric Surgery

The Pediatric Surgeon is often faced with ethical dilemma regarding surgical intervention in a seriously malformed newborn baby. Severe neurological anomalies like anencephaly, extensive meningocele with hydrocephalus and gross neurological deficit, extensive body wall defects, parasitic twins, multiple anomalies involving several systems are some of the examples. Decision-making is always by surrogate, which is in most of the time, the parents or near relatives. The Pediatric Surgeon often has to face a situation in which a severely malformed baby is brought to him for opinion regarding the surgical procedure of which the success is uncertain. Prenatal ultrasonography diagnosis of a serious malformation of the fetus leads to another complex situation in which any one or both the parents may express their doubt about successful outcome of treatment and may desire to terminate the pregnancy. With the advent of prenatal intervention and fetal surgery, legal and ethical questions are being raised. Whatever may be the severity of the fetal malformation, it hardly ever affects the mother's health; but during fetal surgery, complications may occur to the pregnant woman, and could negatively influence the viability of the pregnancy. Decision making in circumstances like these are associated with ethical questions.

Over the years several legal issues had been raised regarding decision making as in the cases of Baby Doe (1984), Baby Jane (1985), and Baby Stephanie Keene (1995) in the USA. Baby Stephanie Keene was born on October 1992 at Fairfax Hospital in Virginia, USA with Anencephaly. After being the center of a major US court controversy and public debate, she remained on intermittent ventilator support for 2 years 174 days and died on April 5, 1995. This raised several issues of bioethics like sanctity of life, definition of death, the concept of futile medical care and allocation of scarce resources by the hospital authority for an otherwise hopeless case.

Baby Doe law passed in 1982 in the United States laid down specific criteria and guidelines for the treatment of seriously ill and/or disabled newborns, regardless of the wishes of the parents. Baby Doe was born with Down syndrome. Parents declined surgery for esophageal atresia with tracheoesophageal fistula, leading to the baby's death. Everett Koop, the famous Pediatric Surgeon of USA argued that the child was denied treatment and nutrition not because the treatment was risky but rather because the child had Down syndrome. Koop commented publicly that he disagreed with such withholding of treatment.¹

A similar situation in 1983 involving a Baby Jane Doe² again brought the issue of withholding treatment for newborns with disabilities to public attention. Baby Jane Doe was born on October 1983 in New York City, with an open meningocele, hydrocephalus and microcephaly. Surgical treatment would have prolonged her life, but

she would be bedridden with severe neurological deficit. The parents refused surgery. Baby Doe Amendment came into effect in June 1985, defining child abuse to include the withholding of fluids, food, and medically indicated treatment from disabled children.

However, there was public debate and both American Hospital Association (AHA) and the American Medical Association (AMA) opposed the amendments. The issue was taken to the US Supreme Court in 1986, and the court ruled in favor of the AHA. The court concluded that the Baby Doe rules interfered with the best interests of the child, interfered with medical decision-making representing an unjustifiable intervention into medical standards. The debate continued in Senate, the Child Abuse Amendments of 1984 was approved by both Houses, and went into effect. Under the rules, withholding treatment is only permissible if the newborn is irreversibly comatose, if treatment would only prolong its death, or if treatment would be inhumane. Furthermore, the law also holds that a physician's decision for neonatal care cannot be based on quality of life, or other abstract concepts. Currently, if a case involves parents or their doctors choosing to withhold treatment, the review boards are obligated to report the case to child services as an instance of medical neglect.

In India, there had been no public debate or legal battle similar to what happened in USA regarding similar issues. In hospitals dealing with such cases, it is usually agreed upon a consensus decision taken by the parents of the child and the team of doctors attending to the case. In most of the cases the attending doctors do not insist on a policy decision by the hospital administration, neither there is any government directives supported by the legal system of the country.

Another important area of controversy is the ethical issues involved in withdrawal or withholding of life saving medical treatment (LSMT) in a terminally ill baby. Unlike the adult patients and their near relatives who can very well take part in decision making regarding the continuance or withdrawal of LSMT, the baby's parents have to approach the treating surgeon for opinion regarding the best interest standard, which includes not only prolongation of life but also improved quality of life.³

Some new ethical issues have come up in recent times involving organ donation after circulatory determination of death (DCDD) with the increasing need for organ transplantation in children.³ The concept of DCDD is

dependent on the understanding of death and controversies existing around it. Under the circumstances, after obtaining consent from the parents for organ donation, the patient under LSMT is taken to operating room where LSMT is withdrawn and patient is allowed to die before organs are harvested for transplantation. This requires a complete ethical counseling of the parents of the child before deciding about DCDD.

The ethical issues surrounding fetal surgery are complicated, as it influences the quality of life for both the pregnant woman and the fetus. What may be beneficial for the fetus should not do any harm to the mother. Risks to the pregnant woman include preterm membrane rupture, preterm labor, wound infection, hemorrhage, and rarely death. The improvement in the future quality of life for the developing fetus is uncertain, and the risks and benefits of fetal surgery must be well explained to the pregnant woman and her husband and other near relatives before planning. Such surgeries fall under the category of clinical trials, and as such are subject to approval of Institutional Ethical Committee. Since the outcome of surgery in the fetus in-utero is still unpredictable, the well being of the pregnant woman must be fully assured before undertaking such procedure. Although fetal surgery is not yet practiced in our country as a routine procedure, necessary rules and regulations need to be formulated before hand.

REFERENCES

1. The C. Everett Koop papers: Congenital birth defects and the medical rights of children: the "Baby Doe" controversy. [cited on 1st May, 2016]; Available from: URL:<http://profiles.nlm.nih.gov/ps/retrieve/Narrative/QQ/p-nid/86>
2. Annas GJ. The case of Baby Jane Doe: child abuse or unlawful Federal intervention? *Am J Public Health* 1984;74(7):727–729.
3. Katz AL. Ethics in Pediatric Surgery in Holcomb GW, Murphy JP, Ostlie DJ. *Ashcraft's Pediatric Surgery*, 6th ed. Elsevier Saunders. 2014; p.1119-1125.

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REVIEW PAPER

Faculty Development in Medical Education: Where Do We Stand in Assam?

Barua Purnima¹, Debajit Hazarika²

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ABSTRACT

Various roles have been ascribed to the medical teacher of today and to function at the optimum, faculty development programmes (FDP) play a very crucial role. Academic activity is largely dependent upon the proficiency of the faculty members and their interest. FDP is a tool for improving the educational vitality of our institutions. Considering the overwhelming changes in medical education scenario and mushrooming of medical colleges in the country, it becomes imperative that the quality and the standards of education are maintained so as to produce a breed of quality doctors. The capacity building of teachers has been considered to be not only a cost effective intervention, but also a long term strategy to link medical education with the national health needs. This article aims at illuminating in a subtle way the evolution of medical education and FDP in Assam till date in the light of tremendous growth in the country. It urges to place the significance and the pressing need of faculty development in the region for the medical teachers to be at par with the counterpart globally.

Keywords: Faculty development programme, Medical education unit, Assam

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INTRODUCTION

As Bland *et al.* has described, faculty development is a “planned program to prepare institution and faculty members for their academic roles including teaching, researcher, administrator, writing scholarship and career management”.¹ Various roles have been ascribed to the medical teacher and to function at the optimum, faculty development plays a very crucial role. It has also been mentioned by authorities on faculty development that “Academic activity is dependent upon the faculty members’ interests and expertise; faculty development has a critical role to play in promoting academic excellence and innovation, and it is a tool for improving the educational vitality of our institutions through attention to the competencies needed by the individual teachers and to the institutional policies required to promote academic excellence.”² Considering the overwhelming changes in medical education scenario and mushrooming of medical colleges in the country, it becomes imperative that the quality and the standards of education is maintained so as to produce a breed of quality doctors.

There has been a phenomenal expansion of medical education over the last few decades. This expansion has also witnessed several pitfalls. The deficiencies in our medical education system have been identified and documented.^{3, 4} Of all the deficiencies highlighted in general, dearth of faculty development is perhaps one of the foremost issues among the factors influencing the quality of medical education. The capacity building of teachers has been considered to be not only a cost effective intervention, but also a long term strategy to link medical education with the national health needs. The teacher of today has to mould oneself into the various

roles of a guide, facilitator, mentor, course planner, student assessor, program evaluator⁵, researcher, administrator and a leader who is capable of judiciously handling all the characters in a balanced manner. In earlier times it was believed that 'good' clinicians may be 'good' teachers and time and experience polish teaching methodologies as well.⁶ Most teachers in medical education accomplish the task of teaching by emulating their seniors, and by trial and error.⁷ However, faculty development helps the teacher to "plan the curriculum, make rational use of media technology, and design an assessment strategy. This is possible only through a systematic approach to faculty development".⁸

FACULTY DEVELOPMENT PROGRAMME IN INDIA

Faculty development activities can be traced back to 1946 when the Bhore Committee suggested the need for training of medical teachers. Following this the World Health Organisation took a global initiative and designated Centre for Educational Development, University of Illinois College of Medicine, Chicago, US, as the International Teacher's Training Centre (IRTTTC).⁴ Thereafter, six Regional Teacher's Training Centre (RTTCs) were established. The regional centres for SE Asia at Srilanka and Thailand were expected to help the countries in establishing the National Teachers Training Centre (NTTC).

Faculty from India were trained at Peradeniya in Srilanka in 1975 and after returning three of the teachers sent from JIPMER, Pondicherry took the initiative to hold the first National Course in Teacher's Training at JIPMER in 1976 with support from the WHO (SEARO), New Delhi. They received financial grant from WHO for running three courses. This centre came to be known as the NTTC, JIPMER. Subsequent to this, the Ministry of Health and Family Welfare, Government of India set up three more centres one each at Post Graduate Institute Medical Education and Research, Chandigarh, Banaras Hindu University, Varanasi and Maulana Azad Medical College, New Delhi where the courses were started from 1981 onwards.

NTTC, JIPMER conducted training in many medical colleges for the local faculty, provided assistance with resource material and helped in establishing Medical Education Units. Several national courses were conducted by these NTTC's till 2002 when the financial grant was stopped and the courses at the NTTC's came to a halt. JIPMER, Puducherry is the only NTTC that is still functioning.⁹ Several institutions started robust activities

on medical education encompassing its various aspects. However, most of these had to close down due to lack of financial aids. Despite all constraints, some of the enterprising teachers after receiving training established Medical Education Units (MEU) during 80's and 90's in their respective colleges. Emergence of MEU's have been noted all over the country especially after its existence has been made mandatory by the Medical Council of India (MCI).³

Another important development that had occurred during this period was the Health Science Initiatives in 1986. Based on recommendation of Professor Rias Ahmed Committee, medical/health science universities were established aiming inter-professional collaboration. Gellula and Yudkowsky have also suggested that if FDP's are to have an impact, they should be held with an interdisciplinary perspective¹⁰. The review and revision of MCI regulations were done under the aegis of the Rajiv Gandhi University of Health Sciences, Karnataka at the Southern Regional Workshop in 2003. Several colleges in the country came up with their MEU's during the 90's, formation of the Indian Association for Advancement of Medical Education, establishment of the KL Wig Centre for Medical Education and Technology, AIIMS in 1989, Consortium of Medical Institutions for Reform in Medical education between 1989-1995 were some of the other events of that period. The present national organization is the Academy of Health Professions' Educators which include educators from all health professions in the country.

In order to boost the activity of MEU's that came up, MCI has been conducting FDP through selected 20 Regional Centres through the Basic Course Workshops (BCW) on MET, since July 2009.¹⁴ Thereafter, as an attempt to keep pace with the development across the globe the need to move from the Basic Course Workshop in Medical Education Technology (MET) towards Advanced Course was recognized by the MCI in 2009, approved in 2010 and in the meeting of the Executive Committee of MCI held on 18-02-2014 and 14-03-2014 it was approved that all Nodal Centers (upgraded 10 Regional Centers) would conduct the Advanced Course Workshop for medical college teachers and 30% of faculty at all levels across all specialties would undergo this training in a phased manner. The Advanced Course was rechristened as Fellowship in Medical Education (FIME) since 2015. The purpose was to develop educational practitioners who can lead educational changes in their institutions to make

medical education responsive to the health needs of the society. Before this certain documents were meticulously drafted like Vision 2015¹⁵, CISP¹⁶ which aimed at supporting faculty in medical colleges in planning, implementing and evaluating the new curriculum through a multi tiered approach but never saw the light of the day.

The most recent revision in MET has been the introduction of the Revised Basic Course Workshop and Sensitization Workshop on Attitude and Communication (AT-COM) module. The revised programme of Basic Course Workshop was drafted by the Expert Group (Drs. Avinash Supe, Rita Sood, JM Kaul and Tejinder Singh) to be implemented from April 1, 2012. It was thought that within 5 years, the MEU in all medical colleges should have all existing faculty trained in Basic Course Workshop and would conduct the Basic Course Workshop for newly inducted faculty twice a year.¹⁷

INTERNATIONAL COLLABORATION

In the beginning of the 21st century (2001) the face of medical education in the country took on a fresh turn after Foundation for Advancement in medical education and Research (FAIMER) Philadelphia, started Fellowship programme of two years to improve Medical Education and health care need worldwide. Since 2005, three Regional Institutes started functioning in India at Seth GS Medical College Mumbai, Christian Medical College Ludhiana, and PSG Institute of Medical Sciences, Coimbatore.

One of the unique initiatives launched in the region in association with FAIMER, Philadelphia by Manipal University in the field of Inter-professional Education and Practice in health context is the MUFILPE – Manipal University Fellowship in International Institute for Leadership in Inter-Professional Education. It is almost recent glorious venture in the field of faculty development.

It may be worth highlighting here that all the Regional Centres (RC) and the Nodal Centres (NC) are distributed all across the country and the fact becomes conspicuous by the absence of such an esteemed centre in the Eastern or North east region. An even distribution of centres could reprimand the failing FDP in these states in addition to the relaxation of the stringent policies of MCI with regards to eligibility criteria of participants and faculty for such workshops.

EVOLUTION OF MEDICAL EDUCATION IN THE STATE: A PERSPECTIVE

While tremendous activities were on in the country in context of medical education, the medical colleges in

Assam also came into the folds of the tide. Several teachers from Assam were sent to NTTC at Banaras Hindu University to pursue the 6-10 days rigorous advanced course during the 80's. Few of the faculty who underwent training are known to the author. They fondly move down the memory lane and narrate the very educative and interesting moments that they had spent during the training course. These courses were held essentially to sensitize the medical teacher on systematic educational planning and motivate them to have MEU in their institution. Though records were not available at the time of writing this script it has been mentioned that the course was also conducted in the Medical Colleges in Assam by faculty from BHUIMS, Varanasi. Not much is known about Medical Education Units being established thereafter or their functioning thereof.

After a gap Maulana Azad Medical College (MAMC) was designated as the Regional Centre for the then existing Medical Colleges of Assam. During 2010, teachers from Silchar Medical College (SMC), Assam Medical College(AMC) and Gauhati Medical College (GMC) were sent to attend the MCI recognized 3 Days Basic Course Workshop in Medical Education Technology.

In 2011, few enthusiastic faculties from the new Medical College at Jorhat were also sent to MAMC, New Delhi to attend the Basic Course Workshop (BCW). Jorhat Medical College (JMC) is the 4th Government Medical College of the region which was established in 2009 after a span of 40 years. After the required number (8 no.) of faculties got trained in Basic Course at the Regional Centre, JMC pioneered conducting the Basic course workshop in 2013 and 2014 under the aegis of Medical Council of India with Observer from the Regional Centre at MAMC, New Delhi.

Meanwhile, two more medical colleges viz. Fakhruddin Ali Ahmed Medical College (FAAMC - 2011) in Barpeta and Tezpur Medical College (TMC - 2012) in Tezpur were established in Assam. FAAMC was initially under the purview of RC- King George's Medical College (KGMC), Lucknow while the other colleges were still under RC-MAMC, New Delhi. It was after the Executive Council's meeting held in 2014 that all the Medical Colleges of Assam were brought under the Nodal Centre, Christian Medical College, Ludhiana (CMCL) to receive training in Revised Basic Course Workshop (RBCW) and Sensitization workshop on AT-COM module and for Fellowship in Medical Education (FIME). However, both the new colleges participated in the BCW held earlier at JMC.

During the time of transition to RBCW and introduction of AT-COM module, conducting BCW in RCs and Medical Colleges was closed. As such, JMC was unable to hold the 3rd Basic Course Workshop scheduled in 2015. At this point it was mandated by the MCI to have only the teachers trained at NC in the newly devised programs as trainers for the future workshops. It was also directed that only MEU and curriculum committee members shall be initially trained. Moreover as mentioned before, it was proposed in the Executive Committee Meeting (2014) that henceforth it would be compulsory for 30% of the faculty to undergo Advanced Course while Basic course should be compulsorily attended by all faculty. It has also been made mandatory that the faculty of MEU has to be trained in the basic course as well as have a Fellowship.¹³ This was a very prompt step taken by the MCI to activate the dormant MEUs and complete the quorum of trained faculty needed to impart training in their respective colleges.

For the above, NC-CMCL had arranged for a MEU Coordinator's meeting followed by Revised Basic Course Workshop and sensitization workshop in AT-COM module in the month of September, 2015 which was well represented by faculty from the Medical Colleges of the State. The Revised Basic Course is an upgradation of the existing one on the framework of Competency based learning. Besides the teachers' training courses, JMC also ventured into other faculty development activities like having a fully functional MEU, conducting microteaching session for student-teachers' (Post graduates), Internship Orientation Programme, Capacity building workshop on Medical Humanities for Students and faculty, introducing medical ethics in curriculum, sensitization lecture on AT-COM module, etc. TMC is also promising out as an active centre. Presently, all the medical colleges of Assam have an MEU although the FD activities need to be initiated in some.

Therefore, it is a well established fact that faculty development in medical education is beginning to gain momentum in India while Assam is still in its nascent stage. There is a long way to go towards its planning and execution in a concrete manner. The number of faculty trained in the six medical colleges in such formal programme is very meagre. Out of the approximately thousand faculties in the medical colleges of the State around 5% have attended the BCW and only a handful is eligible to be trainer. Presently, all the Medical Colleges of the State are under the mentor Nodal Center at CMCL and few faculties are already pursuing the courses there. However, it appears to be a utopian dream to train up the

desired number of faculty at the nodal centre within a short time. Besides the constraint of limited seats per course there is added involvement of expenses and time. As such only a limited number of faculties can be trained per institute. Thus, this will lead to a perpetual demand-supply gap of qualified and trained medical faculties in medical education technology in the state. As such, the need of the hour is to have a teachers training centre in the North-East to develop a critical mass for our region to cater to our requirements. The present scope of activities of MEU appears to be limited and largely concentrated on teacher training, targeting mostly medical teachers.³ Wilkerson and Irby argued that a comprehensive FDP should include 4 elements: professional development especially of new faculty, instructional development and skill building, leadership development and organizational development.²

It had been strongly recommended by the doyens D.K Srinivas and B.V Adkoli that the "NTTC's should be revived. Few more should be established in view of large number of teachers requiring training. There is hardly any faculty development and teacher training activity reported from Eastern and North Eastern India".⁴ The proposal of Assam Medical College as Regional Centre was disapproved in 2012 as sufficient numbers of faculties were not trained at the existing Regional Centre then.

While the state government is planning to bring about a sea of changes in health sector it might be a good idea to take adequate measures to formally train up our teachers to increase their academic competencies, develop need based curriculum to deal with the present day emerging scenario of health care of our state.

In view of above, and before further valuable time is lost the following point may be considered to begin with

1. Sensitize and orient the faculty of the medical colleges in Medical Education Technology through inter-college MEU collaboration
2. Start planning and initiate the process of establishing a common centre of excellence for the region to formally train our teachers in a phased manner by holding workshops from time to time
3. Encourage the motivated faculty to strengthen the existing MEUs and promote educational research amongst teachers
4. Entwine the stake holders for administrative and budgetary support, allocate an amount for in-house faculty development activity in medical colleges

5. Seek support of the Health University for curricular reforms
6. Grant leave and financial support of the teachers to organize and attend workshops, seminars and conferences
7. Assign credit hours to FD activities
8. Initiate principles of education in the beginners' early
9. Mandatory participation of teachers in FDP with incentives and due recognition of faculty towards contribution in faculty training and research should be envisioned
10. Associate with centres like RIMS, Imphal and NEIGHRIMS, Shillong, SMUHS, Gangtok, Medical colleges in Tripura to revamp the medical education scenario of the region at large.

CONCLUSION

It is also pertinent to mention that the State Govt. and the Health University has a major role to play towards faculty development program in medical education keeping in mind our vision to produce quality doctors of today's need and to encourage the faculty to explore into the uncharted waters. The impact of FDP has always been underestimated. It is crucial at this hour that the focus is shifted towards building educational capacity through training teachers and initiating reforms in medical education scenario in the state irrespective of whether it is mandated from a central body like MCI or similar other.

This is in a nutshell the present scenario of Medical Education Technology in the country and its influences on the state.

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REFERENCES

1. Bland CJ, Schmitz CC, Stritter FT, Henry RC, Alusie JJ. Successful faculty in academic medicine: Essential skills and how to acquire them. New York: Springer Publishing Company; 1990.
2. Wilkerson L, Irby DM. Strategies for improving teaching practices: A comprehensive approach to faculty development. *Acad Med* 1998;73:387-96.
3. Adkoli BV, Sood R. Faculty development and medical education units in India: A survey The National Medical Journal of India 2009;22(1):28-32.
4. Srinivas DK, Adkoli BV. Faculty Development in Medical Education: National Perspective. [cited 2008 October]; Available from: URL:<http://www.ncme2007.in>
5. Hegde P. Faculty Development Trends in Medical Education : a Review. *South East Asian Journal of Medical Education* 2013;7(2):11-16.
6. Singh T, Bansal P, Sharma M. A need and necessity for faculty development: the role of medical education units in the Indian context. *South East Asian Journal of Medical Education* 2008;2(1):2-6.
7. Stern DT, Papadakis M. The developing physician – Becoming a professional. *N Engl J Med* 2006;355:1794-9.
8. Bhatnagar K, Srivastava K, Singh A. Is faculty development critical to enhance teaching effectiveness? *Ind Psychiatry Journal* 2010;19(2):139-141.
9. Bansal P, Supe AN. Training of medical Teachers in India: Need for change. *Indian Journal of Medical Science* 2007;61(8):478-484.
10. Gelula M, Yudkowsky R. Microteaching and standardized students support faculty development for clinical teaching. *Acad Med* 2002;77:941.
11. Medical Council of India Regulations on Graduate Medical Education 1997. [cited 2016 Jan 12]; Available from: URL:<http://www.mci.org>
12. MCI Regulations, 1999. *Minimum Standard Requirements for the Medical College for 100 Admissions Annually*. New Delhi: Medical Council of India; 1999. [cited 2016 Jan 12]; Available from: URL:<http://www.mci.org>
13. Medical Council of India. [cited 2016 Jan 12]; Available from: URL:http://www.mciindia.org/fdp/3.%20MCI_decisions_on_MET.pdf
14. Regional and Nodal Centres. [cited 2016 Jan 12]; Available from: URL:<http://www.mciindia.org/InformationDesk/ForColleges/NationalFacultyDevelopmentProgramme.aspx>
15. Vision 2015. [cited 2016 Jan 12]; Available from: URL:http://www.mciindia.org/tools/announcement/MCI_booklet.pdf
16. Curriculum Implementation Support Program: [cited 2016 Jan 12]; Available from: URL:<http://web.tnmgrmu.ac.in/2012/cisp.pdf>
17. Revised Basic Course Workshop and Advanced course: [cited 2016 Jan 12]; Available from: URL:<http://www.mciindia.org/meetings/BOG/2012/February/Minutes>

REVIEW PAPER

Revisiting Pre Anaesthetics Evaluation: A Review

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ABSTRACT

All patients undergoing surgical procedures under general anaesthesia have to undergo pre-anesthetic evaluation, so as to reduce the patient's surgical and anesthetic perioperative morbidity or mortality and also aid in early and eventless recovery. The main aim of pre operative assessment is to identify the medical, social and personnel issue which may have a bearing on the outcome of the anesthetic procedure. There have been numerous studies conducted on what is needed and what is not needed in preoperative assessment. The present paper reviews the need for preoperative assessment and its indications.

Keywords: General anaesthesia, perioperative, oral surgery

INTRODUCTION

All patients scheduled to undergo surgery should be assessed in advance with a view of optimal preparation and perioperative management. Failure to undertake this activity places the patient at increased risk of perioperative morbidity or mortality. Surgical procedures and administration of general anaesthesia is associated with significant stress which is in proportion to the magnitude of injury, total operating time, amount of intraoperative blood loss and degree of postoperative pain.¹ Decreasing the stress response to surgery and trauma is one of the key factors in improving outcome and lowering the length of stay in the hospital as well as lowering the cost. The primary goals of pre anaesthetic evaluation are:^{1, 2, 3}

1. Documentation of the condition for which the surgery is required
2. Assessment of the patient's overall health
3. Uncovering the underlying medical condition that might affect the surgical and anesthetic outcome
4. Perioperative risk determination
5. Optimization of the patient's medical condition in order to reduce the patient's surgical and anesthetic perioperative morbidity or mortality
6. Development of appropriate perioperative care plan
7. Education of the patient about surgery, anesthesia, intraoperative care and postoperative pain treatments in the hope of reducing anxiety and facilitating recovery
8. Reduction of costs, shortening of hospital stay, reduction of cancellations and increase of patient satisfaction.

In 2003, National Institute of Clinical Excellence (NICE)⁴, published recommendation for routine preoperative testing followed by the German Societies of Anaesthesiology

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and Intensive Care Medicine, Internal Medicine, and Surgery in 2010, published joint recommendations on the preoperative evaluation of adult patients for elective, non-cardiac surgery.⁵

In this review, we revisit the guidelines for the pre anesthetic evaluation so as to update the knowledge of preoperative testing and thus avoid over testing and improve patient outcome and satisfaction.

PRE ANAESTHETIC EVALUATION⁶

Screening: This stage aims at filtering the appropriately to determine who requires pre-operative testing via questionnaire and medical examination (past and present medical history). The patients screened who *do not need* to attend the preoperative assessment clinic to see an anaesthetist:

1. Have no coexisting medical problems
2. Require no or only baseline investigations, the results of which are within normal limits
3. Have no potential for, or history of, anaesthetic difficulties
4. Require peripheral surgery for which complications are minimal.

The type of patients who fit into this class are those scheduled for day care surgeries (Ambulatory). These patients will be seen by the anaesthetist at the time of the admission, who will:

1. Confirm the findings of the screening;
2. Check the results of any baseline investigations;
3. Explain the type of anaesthetic appropriate for the procedure;
4. Have the ultimate responsibility for deciding it is safe to proceed.

HISTORY AND PHYSICAL EXAMINATION

To decrease the risk associated with general anaesthesia and surgical procedures, the pre anesthetic evaluation should be done within 6 weeks of the scheduled date of the surgery.⁵

In order to detect underlying medical condition or inadequately treated condition that may affect the outcome of the surgery, one must take a precise medical history (**Table 1**). History should be carried out in an organized manner covering all important and positive findings. The history should include past and present medical history, previous anesthetics and operations, family history, drug history, allergies and social history. The American Society

of Anesthesiologists classification (ASA) is also a useful indicator of the fitness of the patient undergoing general anaesthesia (**Table 1**).

Table 1 ASA Classification

ASA I:	A normal healthy patient
ASA II:	A patient with mild systemic disease
ASA III:	A patient with severe systemic disease
ASA IV:	A patient with severe systemic disease that is a constant threat to life
ASA V:	A moribund patient who is not expected to survive without the operation
ASAVI:	A declared brain-dead patient whose organs are being removed for donor purposes

Cardiovascular System: Symptoms of the following problems must be sought in all patients: (i) Ischaemic heart disease, (ii) Heart failure, (iii) Hypertension, (iii) Conduction defects, arrhythmias and (iii) Peripheral vascular disease.

Patients with a proven history of myocardial infarction (MI) are at a greater risk of perioperative reinfarction, the incidence of which is related to the time interval between infarct and surgery. This time is variable. In a patient with an uncomplicated MI and a normal exercise test elective surgery may only need to be delayed by 6–8 weeks. Heart failure is one of the most significant indicators of perioperative complications, associated with increased risk of perioperative cardiac morbidity and mortality. Its severity is best described using a recognized scale, for example the New York Heart Association classification (**Table 2**). Untreated or poorly controlled hypertension may lead to exaggerated cardiovascular response during anaesthesia. Both hypertension and hypotension can be precipitated, which increase the risk of myocardial and cerebral ischaemia (**Table 3**).

Table 2 New York Heart Association (NYHA) functional classification

Class I:	Cardiac disease without limitation of physical activity, No fatigue, palpitation, dyspnoea or angina
Class II:	Cardiac disease resulting in slight limitation of physical activity. Asymptomatic at rest, ordinary physical activity causes fatigue, palpitation, dyspnoea or angina
Class III:	Cardiac disease causing marked limitation of physical activity. Asymptomatic at rest, less than physical activity causes fatigue, palpitation, dyspnoea or angina
Class IV:	Cardiac disease limiting any physical activity. Symptoms of heart failure or angina at rest, increased with any physical activity

Table 3 NYHA classification for hypertension

Mild (SBP 140–159 mmHg, DBP 90–99 mmHg): No evidence that delaying surgery for treatment affects outcome.
Moderate (SBP 160–179 mmHg, DBP 100–109 mmHg): Consider review of treatment. If unchanged, requires close monitoring to avoid swings during anaesthesia and surgery.
Severe (SBP > 180 mmHg, DBP > 109 mmHg): At this level, elective surgery should be postponed due to the significant risk of myocardial ischaemia, arrhythmias and intra-cerebral haemorrhage. In an emergency, will require acute control with invasive monitoring.

Table 4 History and physical examination

General information	Age, Height, Weight
Current medications	e.g., anticoagulants, anti-angina drugs, analgesics
Past surgical and anesthetic history and any associated problems or complications	e.g., bleeding tendency, protracted awakening from anaesthesia, allergic reactions, transfusion reactions
Cardiopulmonary reserve	e.g., physiologic reserve, MET (Table 5), exercise
Allergies and intolerances	e.g., local anesthetics, non-steroidal anti-inflammatory drugs, antibiotics
Organic disease / potential evidence of organic disease	
Heart/circulatory system	e.g., arterial hypertension, arrhythmia, congenital heart defect, angina pectoris, coronary heart disease, dyspnea
Lungs/respiratory system	e.g., chronic obstructive pulmonary disease (COPD), asthma, pneumonia
Vascular system	e.g., varicose veins, arterial occlusive disease, thrombosis, embolism
Liver and biliary pathways	e.g., hepatitis, jaundice, cirrhosis, gallstones
Kidneys	e.g., renal failure, dialysis, kidney stones
Esophagus/stomach/intestines	e.g., reflux, gastritis, ulcer, strictures, digestive disturbances
Metabolism	e.g., diabetes mellitus, gout

Thyroid gland	e.g., hyperthyroidism
Skeletal system	e.g., scoliosis, arthritis, restricted range of motion
Musculature	e.g., myasthenia, familial muscle disease, malignant hyperthermia
Nervous system, mental function	e.g., epilepsy, depression
Eyes	e.g., cataract, glaucoma
Ears	e.g., hearing impairment, hearing aid
Oral and maxillofacial area	e.g., loose teeth, dentures, bridges, crowns
Female reproductive system	e.g., known or possible pregnancy
Substance consumption	e.g., tobacco, alcohol, illicit substances

Bleeding History

- 1) Have you ever been diagnosed as having a clotting disorder?
- 2) Have you ever had bleeding of any of the following types:
 - a) nosebleed for no apparent reason?
 - b) bruises or very small hematomas under the skin for no apparent reason?
 - c) bleeding into the joints, soft tissues, or muscles?
 - d) prolonged bleeding after a cut or scrape?
- 3) Have you ever had prolonged or unusually intense bleeding after a tooth extraction?
- 4) Have you ever had unusually intense bleeding during or after an operation?
- 5) Are you known to have a problem with wound healing?
- 6) Does anyone in your family have an increased bleeding tendency?
- 7) Have you taken any medications that can affect the blood clotting system in the past two weeks?
- 8) Are you now taking any painkillers or anti-rheumatic drugs?
- 9) For women: Do you have unusually intense or prolonged menstruation (>7 days)?

Physical Examination

Respiratory pathway	e.g., size of oral opening, visibility of uvula and palate, mobility of cervical spine, condition of teeth, thyromental distance, upper-lip-biting test, neck circumference
Heart	e.g., heart sounds, heart murmurs, skipped beats, heart rate and rhythm, blood pressure
Lungs	e.g., respiratory sounds, dullness to percussion, cyanosis
Cardiopulmonary reserve	e.g., if the history is unclear: stress test—doctor and patient climb stairs together
Potential signs of heart failure	e.g., physiologic reserve (by history and/or stress test), dyspnea, edema, signs of venous congestion

RESPIRATORY SYSTEM

Enquire specifically about symptoms of: chronic obstructive lung disease, emphysema, asthma, infection, restrictive lung disease. patients with pre-existing lung disease are more prone to postoperative chest infections, particularly if they are also obese, or undergoing upper abdominal or thoracic surgery. If an acute upper respiratory tract infection is present, anaesthesia and surgery should be postponed unless it is for life-threatening condition.

An indication of cardiac and respiratory reserves can be obtained by asking the patient about their ability to perform everyday physical activities before having to stop because of symptoms of chest pain, shortness of breath, etc. For example:

1. How far can you walk on the flat?
2. How far can you walk uphill?
3. How many stairs can you climb before stopping?
4. Could you run for a bus?
5. Are you able to do the shopping?
6. Are you able to do housework?
7. Are you able to care for yourself?

The problem with such questions is that they are very subjective and patients often tend to overestimate their abilities. to make this more objective, The New York Heart Association (NYHA) Classification of function is one system, but even this uses some subjective terms such as 'ordinary' and 'slight'. The Specific Activity Scale grades common physical activities in terms of their metabolic equivalents of activity or 'mets', and classifies patients on how many mets they can achieve (**Table 5**).

Table 5 New York Heart association classification of cardiac function compared to Specific Activity Scale

NYHA	Functional Classification	Specific Activity Scale Classification
Class I	Cardiac disease without limitation physical activity	No fatigue, palpitation, dyspnoea or angina Can perform activities requiring > 7mets, jog/walk at 5 mph, ski, play squash or basketball, shovel soil
Class II	Cardiac disease resulting in slight limitation of physical activity Asymptomatic at rest, ordinary physical activity causes fatigue, palpitations, dyspnoea or angina	Can perform activities requiring > 5 but < 7 mets. Walk at 4 mph on level ground, garden, rake weed, have sexual intercourse without stopping

NYHA	Functional Classification	Specific Activity Scale Classification
Class III	Cardiac disease resulting in marked limitation of physical activity Asymptomatic at rest, less than ordinary physical activity causes fatigue, palpitations, dyspnoea or angina	Can perform activities requiring > 2 but < 5 mets. Perform most household chores, play golf, push the lawnmower, shower
Class IV	Cardiac disease limiting any physical activity. Symptoms of heart failure or angina at rest, increased with any physical activity	Patients cannot perform activities requiring > 2 mets. Cannot dress without stopping because of symptoms, cannot perform any class III activities

Not all patients can be assessed in this way; for example those with severe musculoskeletal dysfunction may not be able to exercise to the limit of their cardio-respiratory reserve. In such circumstances other methods of assessment are required. The most readily available method of non-invasive assessment of cardiac function in patients is some type of echocardiography.

LABORATORY INVESTIGATION

There is little evidence to support the performance of 'routine' investigations, and these should only be ordered if the result would affect the patient's management. In patients with no evidence of concurrent disease (ASA 1), preoperative investigations will depend on the extent of surgery and the age of the patient (**Table 6**). Even patient's age is not a fixed criteria for conducting such tests. One of the main reasons cited is high prevalence of abnormal laboratory values with no relevance to perioperative risk and the (unnecessary) expense of such testing.⁸ Although laboratory findings tend to deviate from the norm more frequently with increasing age, there is still no correlation between the number of abnormal laboratory findings and the outcome of surgical treatment, even in elderly patients.^{9,10} Conventional clotting tests, such as the activated partial thromboplastin time (aPTT), the international normalized ratio (INR), and the platelet count, are inadequate for the detection of the more common coagulopathies, they are, therefore, less useful than a standardized bleeding history.⁵

Table 6 Baseline investigation in patients with no evidence of concurrent disease (ASA1)

Age of patient	Minor Surgery	Intermediate Surgery	Major Surgery	Major plus surgery
16-39 Consider	Nil Nil	Nil Nil	FBC RFT, BS	FBC, RFT Clotting, BS
40-59 Consider	Nil ECG	Nil ECG, FBC, BS	FBC ECG, BS, RFT	FBC, RFT ECG, BS, Clotting
60-79 Consider	Nil ECG	FBC ECG, BS, RFT	FBC, ECG, RFT BS, CXR	FBC, RFT, ECGBS, Clotting, CXR
>80 Consider	ECG FBC, RFT	FBC, ECG RFT, BS	FBC, ECG, RFTBS, CXR, Clotting	FBC, RFT, ECGBS, Clotting, CXR

According to current evidence, and recommendation by NICE guidelines and American college of cardiology and American heart association guidelines for preoperative cardiac evaluation for noncardiac surgeries. The laboratory and clinical tests should be performed according to the patient's age co-related with ASA classification and presence or absence of underlying systemic co morbid condition. Thus patient falling under ASA grade I would not require fewer laboratory tests as compared to those falling under ASA grade II and higher.

DISCUSSION

Pre anesthetic evaluation is an important part of pre operative preparation of a patient undergoing surgery under general anesthesia.

The aim of pre anesthetic evaluation is to reduce the perioperative and post operative complication, reduce the hospital stay of the concerned patient and to increase patient satisfaction. However, most medical centre are either unaware of the guideline for conducting the laboratory tests or due to medico-legal concerns, leads to over testing of the patient.

Two recent studies in 2012 and 2011 found that over half (52% - 54%) of low-risk patients received unnecessary preoperative laboratory testing.^{11,12} The reason cited for over testing were, unclear responsibility, belief that others want it to be done, lack of knowledge of guidelines and medico-legal concerns.^{13,14,15} This lead to a concern for a developing nation like India, where the majority of patient are not insured or are financially handicapped, thus leading to over burdening. Recent studies have concluded that the strongest predictors of preoperative complications are the patient's pre existing illnesses, as revealed by a thorough history, and the nature of the surgical procedure. Many authors have also concluded that routine laboratory testing alone does not increase the safety of the patient preoperatively or post operatively.

CONCLUSION

Unless the medical history or clinical examination indicate otherwise, routine testing may not be required. Therefore, it is imperative for the surgeon and the physician to be completely aware of the guidelines of preoperative testing, and to test only what is required for the given surgical procedure as indicated by history and the nature of the surgical procedure.

REFERENCES

1. Zambouri A. Preoperative evaluation and preparation for anesthesia and surgery. *Hippokratia* 2007;11(1):13-21.
2. Roizen MF, Foss JF, Fischer SP. Preoperative evaluation. In *Anesthesia*. 5th Edn. Miller RD (ed) Philadelphia, Churchill-Livingstone, 2000, p. 824-883.
3. Kitts JB. The preoperative assessment; who is responsible? *Can J Anesth* 1997;44:1232-1236.
4. National Institute for Clinical Excellence-Pre-operative tests, the use of pre-operative test for elective surgeries. [cited 2015 July 25]; Available from: URL:<http://guidance.nice.org.uk/cg3>
5. Andreas B. Böhmer, Frank Wappler, Bernd Zwissler. Preoperative Risk Assessment-From Routine Tests to Individualized Investigation: *Dtsch Arztebl Intl* 2014;111:437-46.
6. Textbook of Anesthesia – Alan R Atkinhead, David J Rowbothman, Graham Smith.
7. American college of cardiology and American heart association guidelines for pre – operative cardiac evaluation for non – cardiac surgeries.
8. Chung F, Yuan H, Yin L, Vairavanathan S, Wong DT. Elimination of preoperative testing in ambulatory surgery. *Anesth Analg* 2009;108:467-75.
9. Wolf-Klein GP, Holt T, Silverstone FA, Foley CJ, Spatz M. Efficacy of routine annual studies in the care of elderly patients. *J Am Geriatr Soc* 1985;33:325-9.
10. Levinstein MR, Ouslander JG, Rubenstein LZ, Forsythe SB. Yield of routine annual laboratory tests in a skilled nursing home population. *JAMA* 1987;258:1909-15.
11. Benarroch-Gampel J et al. Preoperative Laboratory Testing in Patients Undergoing Elective, Low Risk Ambulatory Surgery. *Ann Surg* 2012;256:518.
12. Katz RI et al. Survey Study of Anaesthesiologists and Surgeons Ordering of Unecessary Preoperative.
13. Katz RI et al. Survey Study of Anesthesiologists' and Surgeons' Ordering of Unnecessary Preoperative Laboratory Tests. *Anesth Analg* 2011;112:207.
14. Patey AM et al. Anesthesiologists' and surgeons' perceptions about routine pre-operative testing in low-risk patients: application of the Theoretical Domains Framework (TDF) to identify factors that influence physicians' decisions to order pre-operative tests. *Implementation Science* 2012;7:52.
15. Brown SR and Brown J. Why Do Physicians Order Unnecessary Preoperative Tests? A Qualitative Study. *Fam Med* 2011;43(5):338.

ORIGINAL PAPER

Effect of Octreotide in Reducing the Serum Amylase and Lipase Levels on Patients with Acute Pancreatitis

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ABSTRACT

A randomized controlled trial has been conducted to evaluate the role of octreotide in reducing serum amylase and lipase in patients admitted with acute pancreatitis. 100 patients with acute pancreatitis were selected for the study and the effect of sub-cutaneous octreotide was looked into in reducing the serum levels of the enzymes, amylase and lipase. Out of these 100 cases, 56 patients had acute biliary pancreatitis, 33 patients had acute alcoholic pancreatitis and 8 patients had idiopathic pancreatitis. There were 2 patients with biliary helminthiasis presenting with acute pancreatitis and 1 patient presented with acute pancreatitis following trauma. Serum amylase and lipase was recorded in all patients on admission. Octreotide (100 micrograms x 3) was given subcutaneously to 50 patients selected randomly along with conventional treatment (Group A) and other 50 patients were given only conventional treatment (Group B) irrespective of their aetiology, age, sex and severity. Serum amylase and lipase was again measured after 48 hours of admission. The change in the level of serum amylase and lipase was calculated in both Group A and Group B and statistical significance was determined. In our study those patients who received octreotide, i.e., Group A had a reduction of serum amylase by 82% and serum lipase by 70% whereas those patients who did not receive octreotide, i.e., Group B had a reduction of serum amylase by 73% and serum lipase by 59%. This difference between Group A and Group B was found to be statistically significant for both serum amylase ($p=0.0028$) and serum lipase ($p=0.0437$) by T-test and ($p=0.00798$ and $p=0.0437$) by Mann-Whitney U test respectively.

Keywords: Octreotide, amylase, lipase, pancreatitis, Mann-Whitney test

INTRODUCTION

Acute pancreatitis is an inflammation and autodigestion of glandular parenchyma of pancreas which lead to injury or destruction of acinar components. It can be initiated by factors, like gallstones, alcohol, trauma, and infections, etc. It can be hereditary too. Acute pancreatitis is classified into mild and severe forms. Majority of patients suffer from mild acute pancreatitis, a self limiting disease, which responds well to conservative treatment. In up to 20% of patients with acute pancreatitis, however, the disease progresses to a severe form involving both pancreatic and extrapancreatic necrosis. The generally prevalent belief today is that pancreatitis begins with the activation of digestive zymogens inside acinar cells, which cause acinar cell injury. The diagnosis of acute pancreatitis can be made when a patient presents with three fold elevated

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serum levels of amylase or lipase. If the patient presents within 24 hours after the onset of pain, the elevated serum pancreatic enzymes predict pancreatitis with a sensitivity of 98% and a specificity of 90%. Activated pancreatic enzymes seem to be involved in the generation and progression of this “autodigestive” acute inflammatory disease, and it was therefore hypothesized that the administration of somatostatin or its analogue octreotide might help prevent progression of the disease and its complications. This approach is somewhat controversial; however, as it is not clear whether pancreatic secretion continues to occur during the course of acute pancreatitis. Animal studies show an appreciable reduction of secretion in the inflamed pancreas, but studies in humans are not conclusive.

Octreotide is a synthetic, a long acting octapeptide analogue of the native hormone somatostatin, became available in 1982. It is a powerful inhibitor of basal and stimulated exocrine pancreatic secretion in healthy volunteers, and can be given subcutaneously. Octreotide have been shown to inhibit both pancreatic endocrine and exocrine function. This study is a prospective randomized controlled trial to assess whether octreotide reduces the elevated serum levels of amylase and lipase in patients admitted with diagnosis of acute pancreatitis.

MATERIALS AND METHODS

A prospective randomized controlled study was carried out among the patients with the diagnosis of acute pancreatitis admitted in the department of general surgery and general medicine of Gauhati Medical College and Hospital, Guwahati, Assam for a period of one year from 1st August 2012 to 31st July 2013.

Patients Selection: Inclusion Criteria: The diagnosis of acute pancreatitis was confirmed by the presence of clinical signs and symptoms of acute pancreatitis along with:

- Raised levels of serum amylase and/or serum lipase more than 3 times the normal serum level and/or;
- Radiological evidence of acute pancreatitis either in ultra sound study, in CT scan or both.

Exclusion Criteria: Patients with acute pancreatitis along with hollow viscous perforation and generalised peritonitis was excluded from the study.

Study Population: 100 patients were randomized. Out of 100 patients, 50 patients were included in study group and 50 patients as control group. The study group was regarded as Group A and the control group as Group B. The study group received Octreotide 100 mcg injection subcutaneously 8 hourly in addition to the treatment protocol of acute pancreatitis whereas the control group did not receive Octreotide.

STATISTICAL ANALYSIS

- a. The mean of the differences of serum amylase and lipase levels at the time of admission and after 48 hours were calculated in both the study (Group A) and control group (Group B).
- b. Test method: An unpaired T test was carried out between the mean values of Group A and Group B to find if the difference was statistically significant.
- c. Using the sample data, standard deviation, standard error of mean, degrees of freedom and P-value was calculated to test the significance between the study and the control group.

RESULTS AND OBSERVATION

Age Incidence: In the present study, the age of the patients ranges from 15 to 74 years. The mean age was 36.9 years.

Sex Incidence: Out of 100 cases of acute pancreatitis, 63 were males and 37 were females. The male: female ratio was 1.7:1.

Aetiology: 56 patients had acute biliary pancreatitis, 33 patients had acute alcoholic pancreatitis, 2 patients were found to have worms in CBD, 1 patient had acute pancreatitis following trauma. In 8 patients, no cause could be determined and were termed as idiopathic pancreatitis.

Assessment of Severity of Acute Pancreatitis: All 100 cases were assessed and severity graded according to the Ranson's Criteria. Ranson's score ≤ 3 were graded as mild pancreatitis and Ranson's score >3 were graded as severe pancreatitis. In addition we maintained the severity scoring as per our own scoring system.

Table 1 Types of Acute Pancreatitis on the basis of Severity

Grading	Gallstone Pancreatitis	Non-Gallstone Pancreatitis	Total no. of patients	Percentage (%)
Severe (Ranson's Score >3)	12	7	19	19%
Mild (Ranson's Score <3)	44	37	81	81%

Table 1 represents the types of pancreatitis and their severity. We had severe gall stone pancreatitis (Ranson's >3) 12, and non-gall stone pancreatitis 7. This made it 19% of the total cases in the study. We had 81% Mild cases (Ranson's <3) out of which gall stone pancreatitis was 44 and non-gallstones cases were 37.

Role of Octreotide over Amylase and Lipase level in patients with acute pancreatitis and its statistical significance is given in the **Table 2**.

Table 2 Effect of octreotide on serum amylase as well as lipase

	Serum Amylase (u/l)			Serum Lipase (u/l)		
	At Admission (mean)	At 48 hours (mean)	Mean Difference	At Admission (mean)	At 48 hours (mean)	Mean Difference
Group A (patients who received Octreotide)	1523.16	238.46	1239.70 (82%)	2468.72	728.36	1740.36 (70%)
Group B (patients who did not received Octreotide)	1521.04	430.86	1090.18 (73%)	2367.94	1069.26	1568.68 (59%)

Table 2 shows the effect of octreotide in reducing the levels of serum amylase and lipase after 48 hours of treatment. Thus during the course of acute pancreatitis, amylase was inhibited by 82% in Group A patients receiving Octreotide with a mean reduction of 1239.70 u/L within 48 hours and 73% in Group B patients not receiving Octreotide with a mean reduction of 1090.18 u/L within 48 hours.

On the other hand, lipase was inhibited by 70% in Group A patients receiving Octreotide with a mean reduction of 1740.36 u/L within 48 hours and by 59% in Group B patients not receiving Octreotide with a mean reduction of 1568.68 u/L within 48 hours.

Table 3 shows the statistical analysis of serum amylase reduction within 48 hours in Group A and Group B.

P-value and Statistical significance:

Table 3 The Student's T-test was done between Group A and Group B to analyze the statistical significance

Results	Serum Amylase	Serum Lipase
t=	3.0623	2.0432
df=	98	98
Standard error of difference=	48.825	84.024.
CI= The mean of Group A- The mean of Group B=	149.5200	171.6800
95% CI of this difference=	52.6274 to 246.4126	4.9378 to 338.4222
P- value	0.0028.	0.0437

It is evident from the table above that the reduction of serum amylase and lipase in Octreotide treated group is found to be statistically significant by student's T-test.

Table 4 Mann-Whitney U test was performed between the two groups

Results	Serum Amylase	Serum Lipase
Z- score	2.4128	1.8165
U- value	899.5	986
p- value	0.00798	0.03438

Similar to the earlier table the above-mentioned table shows the reduction of serum amylase and lipase in Octreotide treated group is found to be statistically significant by Mann-Whitney U test.

DISCUSSION

The present study evaluates the role of octreotide in reducing the level of serum amylase and serum lipase in first 48 hours and its statistical significance. The study also compares the percentage of reduction of serum amylase and serum lipase between the study group (Group A) and control group (Group B) in relation to age, sex, aetiology and severity of the disease.

The age of the patients in the present study ranged from

15 to 74 years with mean age of 36.9 years (**Table 5**). Incidence of disease was highest in the age group 25-44 years (61%).

Table 5 Age incidence of different studies

Study	Number of Patients	Range	Median (in years)
OzkanKarakoyunlar et al, 1999 ¹	43	24-86	57.03
Uhl et al, 1999 ²	302	18-93	50
Paran et al, 2000 ³	50	43-67	55
Garg et al. 2001 ⁴	169	15-80	41.3
Nippon R et al.2004 ⁵	1688	13-79	62
Yeung YP et al. 2006 ⁶	101	20-96	64
Papachirstou et al.2009 ⁷	185	15-90	52
Peter J et al.2012 ⁸	242	20-83	47
Present study	100	15-74	36.9

In the present study male preponderance was seen with M:F ratio 1.7:1. The different studies having the similarities with the present studies are narrated in **Table 6**.

Table 6 Sex incience of different studies

Study	Total cases	Males	Females	M:F
OzkanKarakoyunlar et al ¹	43	14(32%)	29(68%)	0.48:1
Uhl et al ²	302	198(65.6%)	104(34.4%)	1.9:1
Paran et al ³	50	22(44%)	28(56%)	0.78:1
Garg et al ⁴	169	116(68.63%)	53(31.3%)	2.1:1
Nippon R et al ⁵	1688	1047(62%)	641(48%)	1.6:1
Yeung YP et al ⁶	101	43(42.6%)	58(57.4%)	0.74:1
Papachirstou et al ⁷	185	94(51%)	91(49%)	1.03:1
Peter J et al ⁸	242	159(65%)	83(35%)	1.8:1
Present study	100	63(63%)	37(37%)	1.7:1

In the present study the most common aetiology of acute pancreatitis was biliary in origin consisting of 56% of cases. Alcohol abuse was the second most common cause with 32% of the cases. In 8% of the cases no cause could be determined. Helminthiasis was found in 2% of cases and trauma was found in 1% of cases. This findings were supported by Uhl et al², Paran et al³, Papachirstou et al⁷ and Peter J et al.⁸

We calculated the Ranson's score of the 100 cases and found that 19 patients suffered from severe acute

pancreatitis with Ranson's score >3 and 81 patients had mild disease with Ranson's score <3.

This study closely resembles the study of Kemmer TP et al. 1992⁹, where the influence of octreotide was seen on human pancreatic secretion. The study showed that during secretin and ceruletide stimulation, amylase was significantly inhibited by 84%, 78%, and 81% with 5, 20, and 80 micrograms/h octreotide, respectively. All decreases p value less than 0.05. and thus were statistically significant.

Friess H et al, (1994)¹⁰, analyzed the effect of octreotide (3 x 100 micrograms, daily) given over a time period of 7 days on hormone-stimulated exocrine pancreatic secretion in 6 healthy volunteers using a secretin-ceruletide test. Following the first injection of octreotide and following 7 days of octreotide treatment secretin/ceruletide-stimulated amylase, trypsin and chymotrypsin secretion was significantly inhibited by 84%, 76%, and 77%.

R. Arcidiacono et al¹¹ evaluated the potential of octreotide to prevent acute pancreatitis in patients who underwent endoscopic sphincterotomy (EST).

OzkanKarakoyunlar et al¹, studied 43 patients with a diagnosis of acute pancreatitis treated with high dose octreotide 0.5 mcg/kg/hr by continued intravenous infusion and found that the decrease in serum amylase was significantly more pronounced in the octreotide treated group (p< 0.000 with t-test for paired samples; p=0.0004 with Mann-Whitney U test).

Most of the studies dwelling on the subject has mentioned the use of sub-cutaneous injection of octreotide to prevent as well as the treatment of acute pancreatitis^{11,12,13,14,15}. In the present study we could produce evidence that octreotide reduces the level of serum amylase and serum lipase in patients suffering from acute pancreatitis.

CONCLUSION

This study was undertaken to see the effect of sub-cutaneous octreotide on the serum levels of amylase and lipase in patients with acute pancreatitis. The idea was to see if octreotide can significantly reduce the high levels of serum amylase and lipase in patients with acute pancreatitis. The finding was striking. Subcutaneous octreotide reduced the levels of both the enzymes within 48 hours significantly in all cases. In fact although not statistically significant, it reduced hospital stay in these patients.

So it can be suggested that sub cutaneous octreotide in acute pancreatitis cases may be used with the other standard management strategy. It may help the enzyme related damages to the pancreas as well as the surrounding organs to reduce.

Conflict of interest: None declared.

Ethical clearance: Taken.

Source of funding: None declared.

Declarations:

- (1) The article is original with the author(s) and does not infringe any copyright or violate any other right of any third parties;
- (2) The article has not been published (whole or in part) elsewhere and is not being considered for publication elsewhere in any form, except as provided herein;
- (3) All author (s) have contributed sufficiently in the article to take public responsibility for it and
- (4) All author (s) have reviewed the final version of the above manuscript and approve it for publication.

REFERENCES

1. Karakoyunlar O, Sivrel E, Tanir N. High dose octreotide in the management of acute pancreatitis. *Hepatogastroenterology* 1999;46:1968–72.
2. Uhl W, Buchler MW, Malfertheiner P, Beger HG, Adler G, Gaus W. A randomised, double blind, multicentre trial of octreotide in moderate to severe acute pancreatitis. *Gut* 1999;45:97-104.
3. Paran H, Mayo A, Paran D, Neufeld D, Shwartz I, Zissin R et al. Octreotide treatment in patients with severe acute pancreatitis. *Dig Dis Sci*.2000 Nov;45(11):2247-51.
4. Garg PK, Tandon RK, Madan K. Is biliary microlithiasis a significant cause of idiopathic recurrent acute pancreatitis? A long-term follow-up study. *Clin GastroenterolHepatol* 2001;5:75–79.
5. Nippon Rhinso. Epidemiology of acute pancreatitis-incidence by etiology, relapse rate, cause of death and long term prognosis. *Japanese J Clin Med* 2004;62(11):1993-97.
6. Yeung YP, Lam BY, Yip AW. APACHE system is better than Ranson system in the prediction of severity of acute pancreatitis. *HepatobiliaryPancreat Dis Int* 2006;5:294–9.
7. Papachristou GI. Prediction of severe acute pancreatitis: current knowledge and novel insights. *World J Gastroenterol* 2008;14:6273–5.
8. Peter Jordanav. Predictors of mortality in acute pancreatitis: a retrospective study. *WebmedCentral Pancreatology* 2012;3(1):WMC002925.
9. Büchler MW, Binder M, Friess H. Role of somatostatin and its analogues in the treatment of acute and chronic pancreatitis. *Gut* 1994;35:S15-S19.
10. Kemmer TP, Malfertheiner P, Büchler M, Friess H, Meschenmoser L, Ditschuneit H. Inhibition of human exocrine pancreatic secretion by the long-acting somatostatin analogue octreotide (SMS 201-995). *Aliment Pharmacol Ther* 1992 Feb;6(1):41–50.
11. Friess H, Bordihn K, Ebert M, Malfertheiner P, Kemmer T, Dennler HJ et al. Inhibition of pancreatic secretion under long-term octreotide treatment in humans. *Digestion* 1994;55:10–15.
12. Arcidiacono R, Gambitta P, Rossi A, Grosso C, Bini M, Zanasi G. The use of a long-acting somatostatin analogue (octreotide) for prophylaxis of acute pancreatitis after endoscopic sphincterotomy. *Endoscopy* 1994;26(9):715-8.
13. Colin McKay, John Baxter, Clem Imrie. A randomized, controlled trial of octreotide in the management of patients with acute pancreatitis. *International Journal of Pancreatology* 1997 February;21(1):13-19.
14. Yang F, Wu H, Li Y, Li Z, Wang C, Yang J et al.Prevention of severe acute pancreatitis with octreotide in obese patients: a prospective multi-center randomized controlled trial. *Pancreas* 2012 Nov;41(8):1206-12.
15. Wang R, Yang F, Wu H, Wang Y, Huang Z, Hu B et al. High-dose versus low-dose octreotide in the treatment of acute pancreatitis: a randomized controlled trial. *Peptides* 2013 Feb;40:57-64.

ORIGINAL PAPER

Chronic Kidney Disease with Special Reference to Dyslipidemia

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ABSTRACT

Background: Lipid abnormalities in chronic kidney disease (CKD) are significant, because atherosclerotic heart disease is the foremost cause of morbidity and mortality in patients with end stage renal disease. The growing recognition that dyslipidemia is a major risk factor for coronary heart disease has prompted interest in the identification and management of abnormalities in plasma lipids and lipoproteins. **Method:** It was hospital based observational study conducted from January 2014 to January 2015 in Department of Medicine and Nephrology, Gauhati Medical College, where 50 patients of chronic kidney disease were included and evaluated for dyslipidemia. **Results:** Most common presenting symptoms were swelling of legs (80%), followed by anorexia, nausea, vomiting (72%), puffiness of face (64%), decrease urine output (60%). 100% patients presented with anemia, 80 % with edema and 76% with hypertension. 24 (48%) patients had normal ECG, 13 (26%) patients had left ventricular hypertrophy (LVH). 13 patients (26%) had hyperkalemia. Mean total cholesterol (TC) was 189 ± 43.3 mg/dl, triglyceride 174 ± 60.7 , high density lipoprotein (HDL) 36.51 ± 5.1 , very low density lipoprotein (VLDL) 34.88 ± 12.15 , low density lipoprotein (LDL) 116.49 ± 38.34 and HDL/TC ratio 0.2002 ± 0.0478 . **Conclusion:** Dyslipidemias are the important predictive indices for the risk of developing coronary artery disease in chronic kidney disease patients, and so early evaluation and treatment of dyslipidemia may improve the cardiovascular outcome.

Keywords: Chronic kidney disease, dyslipidemia

INTRODUCTION

Lipid abnormalities in chronic kidney disease (CKD) are significant, because atherosclerotic heart disease is the foremost cause of morbidity and mortality in patients with end stage renal disease. Cardiovascular disease is a major cause of morbidity and mortality among patients with chronic kidney disease.¹⁻³ The growing recognition that dyslipidemia is a major risk factor for coronary heart disease has prompted interest in the identification and management of abnormalities in plasma lipids and lipoproteins. In CKD the most prevalent lipid disorders are hypertriglyceridemia and decrease in high density lipoprotein (HDL) concentration. Low density lipoprotein (LDL) levels are usually normal or marginally increased.⁴⁻⁶ Also there are reports available regarding accelerated atherosclerosis in chronic kidney disease due to altered lipid metabolism. In recent years, the levels of high density lipoproteins have gained importance in view of the fact that increasing reports are available incriminating decreased high density lipoprotein (HDL) levels as one of risk factors for cardiovascular disease. So, the analysis

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of lipoprotein subclass in chronic kidney disease patients is very much essential to assess the clinical outcome.

Aims: (i) To identify the different lipoprotein fractions in patients with chronic kidney disease and (ii) To identify the pattern of dyslipidemias in conservatively treated patients and in patients managed with hemodialysis.

MATERIALS AND METHODS

The present study was a hospital based observational study conducted from January 2014 to January 2015 in Department of Medicine and Department of Nephrology (both OPD and Indoor), Gauhati Medical College and Hospital, where 50 patients of chronic kidney disease were included. Chronic kidney disease (CKD) is defined as kidney damage or glomerular filtration rate (GFR) below 60 ml/min per 1.73 m² for 3 months or more irrespective of the cause. CKD patients are divided into 5 stages according to GFR as shown in **Table 1**.

Table 1 Stages of Chronic kidney disease

Stages	GFR (ml/min)
1	≥ 90
2	60- 89
3	30- 59
4	15- 29
5	< 15

Chronic kidney disease was diagnosed by clinical, biochemical and ultrasonographic evidence. Patients of chronic kidney disease age more than 12 years were included. Patients with diabetes mellitus, thyroid and liver disease, history of alcohol consumption and smoking, lipid lowering drugs and patient on CAPD (continuous ambulatory peritoneal dialysis) were excluded. The patients included in the study were subjected to a detailed history, physical examination and laboratory tests. Study of lipid profile was done by enzymatic method by using autoanalyser.

RESULTS

In the present study, 50 patients of CKD were included, out of which 31 patients (62%) were male and 19 patients (38%) were female. On decade wise grouping, maximum numbers of patients were in the age group 41-50 years (30%). Mean age for male was 46.6 years and that for female was 45.4 years. Male to female ratio in the study group was 1.6:1. The age and sex distribution of the patients were shown in **Table 2**.

Table 2 Showing the age and sex distribution of the patients

Age Group	Total No Of Cases	Percentage	Male	Percentage	Female	Percentage
<20	2	4	1	50	1	50
21-30	8	16	4	50	4	50
31-40	5	10	5	100	0	0
41-50	15	30	9	60	6	40
51-60	10	20	5	50	5	50
61-70	9	18	6	66.66	3	33.34
>70	1	2	1	100	0	0
Total	50	100	31		19	

Most common presenting symptom was swelling of legs (80%). Anorexia, nausea, vomiting was present in 72% of patient, puffiness of face was present in 64 % of patients, decreased urine output was present in 60 % of patients, and breathing difficulty was present in 32% of patients. All the patients (100%) included in the study had anemia, 80 % of patient had edema, 76% of patient had hypertension, 36% of patient had ascites, 32% of patient had pleural effusion, 32% of patients had acidotic breathing, 20% of patient had raised JVP and 16% of patient had altered sensorium. The presenting symptoms and the clinical signs are shown in **Table 3** and **Table 4** respectively.

Table 3 Showing the presenting symptoms among CKD patients

	Swelling of legs	Puffiness of face	Decrease urine output	Anorexia nausea vomiting	Breathing difficulty
Patients	40	32	30	36	16
Percentage	80%	64%	60%	72%	32%

Table 4 Showing the clinical signs in CKD patients

	Anemia	Hypertension	Edema	Raised JVP	Ascites	Pleural effusion	Acidotic breathing	Altered sensorium
Patients	50	36	40	10	18	16	16	8
Percentage	100%	72%	80%	20%	36%	32%	32%	16%

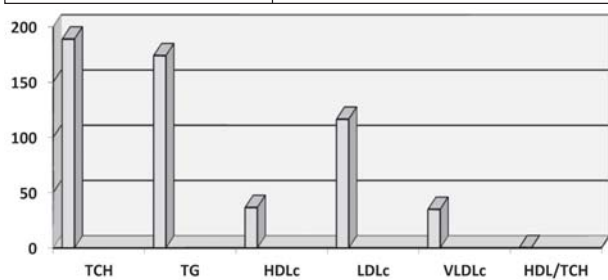
Nine (9) patients were in stage 3, 18 patients were in stage 4 and 23 patients were in stage 5. Stage 3 and stage 4 patients were treated conservatively and stage 5 patients were on renal replacement therapy (hemodialysis). Mean values for urea was 135.26 ± 41.99 mg/dl and creatinine 11.12 ± 5.09 mg/dl.

Out of 50 patients, 24 (48%) patients had normal electrocardiogram (ECG). 13 (26%) patients had left ventricular hypertrophy (LVH) of which 9 (69.23%) were male and 4 (30.77%) were female. 13 patients (26%) had changes of hyperkalemia of which 8 (61.54%) were male and 5 (38.46%) were female.

The mean total cholesterol (TC) was 189 ± 43.3 mg/dl, mean triglyceride was 174 ± 60.7 mg/dl, mean HDL was 36.51 ± 5.1 mg/dl, mean very low density lipoprotein (VLDL) was 34.88 ± 12.15 mg/dl, mean low density lipoprotein (LDL) was 116.49 ± 38.34 mg/dl and HDL/TC ratio 0.2002 ± 0.0478 . The mean values of the lipid profiles are shown in the **Table 5** and **Graph 1** below:

Table 5 Showing the biochemical (lipid profile) data in CKD patients (Mean \pm SD) mg/dl

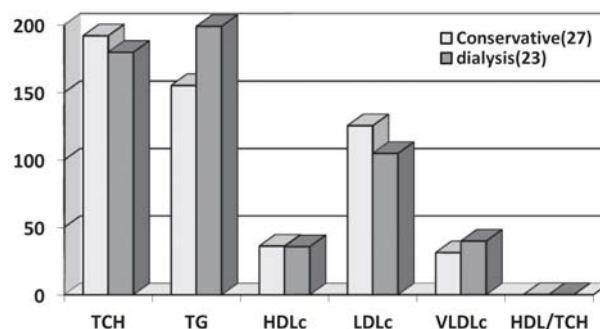
Total cholesterol	189 ± 43.3
Triglyceride	174 ± 60.7
HDLc	36.51 ± 5.1
LDLc	116.49 ± 38.34
VLDLc	34.88 ± 12.15
HDL/TC	0.2002 ± 0.0478

**Graph 1** Lipid profile in CKD patients

The lipid profile of the patients in the conservative group and in the hemodialysis group are shown in **Table 6** and **Graph 2** below

Table 6 Showing lipid profile in the conservative and hemodialysis group

Group	Conservative Treatment (N=27)	Dialysis (n=23)	t-value	p-value
Total Cholesterol	191.990 ± 50.73	179.826 ± 31.66	0.7595	ns
Triglyceride	155.176 ± 47	199.01 ± 70	2.052	Sig $p < 0.05$
HDLc	36.1 ± 5.76	35.7 ± 5.20	0.1964	ns
LDLc	125.38 ± 44.3	104.87 ± 25.10	1.492	ns
VLDLc	31.27 ± 9.525	39.82 ± 14	1.991	ns
HDL/TC	0.20 ± 0.053	0.202 ± 0.0405	0.1130	ns

**Graph 2** Comparison of lipid profile between conservative and dialysis group

The above table 6 and graph 2 shows comparison of biochemical mean values of TC, TG, HDL, and HDL/TC between patients managed conservatively and patients managed with hemodialysis. Mean total cholesterol in patients on conservative treatment was 191.99 ± 50.73 mg/dl and for patients on hemodialysis it was 179.826 ± 31.66 mg/dl and this difference was statistically not significant ($P > 0.05$). The mean triglycerides in patients of CKD on conservative treatment was 155.1764 ± 7 mg/dl and the mean triglycerides in hemodialysis group was 199.01 ± 70 mg/dl. This difference was statistically significant ($P < 0.05$). The mean HDL value in conservative treatment group was 36.1 ± 5.76 mg/dl and the mean HDL value in hemodialysis group was 35.7 ± 5.20 mg/dl and this difference was statistically not significant. The mean LDL value in CKD patients on conservative group was 125.38 ± 44.3 mg/dl and the mean LDL value in hemodialysis

group was 104.87 ± 25.10 mg/dl and this difference was statistically not significant. The mean VLDL values for patients in conservative group and hemodialysis group was 31.27 ± 9.525 mg/dl and 39.82 ± 14 mg/dl respectively and this difference was statistically not significant. The difference in mean values of HDL/TC in both conservative treatment group and hemodialysis group was also statistically not significant.

On comparing mean values of TC, TG, HDL, LDL, VLDL values between male and female patients, there was increase in TG and decrease in HDL in male patients and there was increase in TC and LDL in female patients. However these differences were statistically not significant ($P > 0.05$)

33 patients (66%) had total cholesterol < 200 mg/dl (desirable range) and 17 patients (34%) had abnormal value, among them 12 (24%) patients had borderline high values (200- 239 mg/dl) and 5 (10%) patients had high values (> 240 mg/dl). 19 patients (38%) had normal TG values (< 150 mg/dl), 31 patients (62%) had elevated TG values, among them 16 patients (32%) had TG in borderline high (150-199 mg/dl) range and 15 patients (30%) had TG in high (200-499 mg/dl) range. This was statistically significant ($P < 0.05$). 41 patients (82%) had HDL values < 40 mg/dl, 9 patients (18%) had HDL > 40 mg/dl. 17 patients (34%) had normal LDL levels (< 100 mg/dl), 17 patients (34%) had near optimal LDL levels (101-129 mg/dl), 8 (16 %) had borderline high LDL levels (130-159 mg/dl), 6 (12 %) had high LDL levels (160- 189 mg/dl) and 2 (4 %) patients had very high LDL levels (> 130 mg/dl). This was statistically not significant ($p > 0.05$).

DISCUSSION

In the present study, out of 50 patients of CKD, 31 patients (62%) were male and 19 patients (38%) were female. Maximum number of patients was in the age group 41-50 years (30%) and the mean age for male was 46.6 years and that for female was 45.4 years.

In the study group of CKD patients 18% were in stage 3, 36% stage 4, 46% stage 5. Total 27 patients were treated conservatively (stage 3 & stage 4) and 23 patients (stage 5) were treated by hemodialysis.

In this study, triglyceride levels were markedly elevated. P.O Attman et al.⁷ stated that hypertriglyceridemia is the most common plasma lipid abnormality found in patients of chronic kidney disease.

The cause for hypertriglyceridemia in chronic kidney

disease patients has not been clearly delineated. Available data derived from Kinetic studies have demonstrated that reduced catabolism of triglycerides is the predominant defect due to deficiency of lipoprotein lipase⁷⁻⁹ or hepatic triglyceride lipase or both. Reasons for decrease in activity of these enzymes are not clear. It can be possibly due to:

- Presence of circulatory inhibitor of lipolytic enzymes in the serum¹.
- Changes in apoprotein concentrations which can effect lipoprotein lipase activity
- Insulin resistance seen in renal insufficiency⁷
- Alteration of lipoprotein substrate¹⁰

The relationship between hypertriglyceridemia and atherosclerotic heart disease is far less clear. Thomas Quaschnig et al.¹¹ reported that combined hyperlipidemia (elevated cholesterol and triglycerides) with low HDL cholesterol reflects more atherogenic condition.

In the present study, there was decrease in high density lipoprotein (HDL) cholesterol seen in CKD patients. P.O. Attman et al.⁷ found decrease in plasma high density lipoprotein (HDL) cholesterol concentration in patients with chronic kidney disease. It was also reported that decreased HDL was associated with decrease in both the fractional catabolic rate and the total synthetic rate of ApoA1/HDL. The slow fractional catabolic rate of Apo A1 in patients with chronic kidney disease could be a primary event resulting from a decrease in synthesis or secretion of Apo A1. John D Bagdade et al.¹² demonstrated that patients of renal failure treated by chronic dialysis have lower HDL levels compared to controls.

There was marginal increase of serum total cholesterol in chronic kidney disease patients. P.O. Attman et al.⁷ in their study showed no significant change in levels of total cholesterol. Thomas Quaschnig et al.¹¹ reported combined hyperlipidemia (elevated total cholesterol and triglycerides) in their study.

The present study showed no significant increase in LDL levels in CKD patients. In uremia LDL lipoproteins are qualitatively altered. Marion Morena et al.¹³ reported that there was increase in small, dense LDL sub-fractions in hemodialysis patients.

Hypertriglyceridemia observed in hemodialysis patients results from a reduced lipolysis of TG rich VLDL that leads to the accumulation of partially metabolized remnant lipoproteins (IDL and TG rich LDL). This lipoprotein catabolism impairment is usually associated with reduced

levels of HDL affecting reverse cholesterol transport. Such defect in atherogenic lipoprotein catabolism may predispose to the formation of small dense LDL particles, which appear to be more sensitive to ex vivo oxidation.

On comparing the lipid profile values between dialysis and conservatively managed patient it was seen that total cholesterol levels were decreased in patients on hemodialysis (HD) as compared to patients treated by conservative line but this difference was statistically not significant ($P>0.05$). HDL levels were marginally low in patients of HD compared to conservatively treated patients but this was also statistically not significant. VLDL in HD group was modestly increased compared to conservative group but this was also statistically not significant ($P>0.05$). LDL values were modestly low in patient treated with hemodialysis as compared to patients treated conservatively however this difference was statistically not significant. There was significant increase in triglycerides in patients treated with hemodialysis compared to patients on conservative treatment ($P<0.05$).

John D. Bagdade et al.¹² studied lipid profile in 27 patients of CKD of which 13 patients were on conservative treatment and 14 patients were on dialysis and they found that triglycerides were found to be elevated in both non dialysed and dialysed CKD patients.

Morena Marion et al.¹³ in their study on hemodialysis patients stated that hemodialysis patients are exposed to several atherogenic factors resulting from qualitative and functional lipid abnormalities, including triglyceride rich particles, increased susceptibility to LDL oxidation and impairment of HDL protective effects.

S.M. Alamet al.¹⁴ studied serum lipoprotein fractions in patients of CKD of conservatively managed group and those on maintenance hemodialysis (HD). The total cholesterol in the conservative group was 232.3 ± 56 and in HD group was 160.8 ± 56.4 , triglycerides in the conservative group was 243.7 ± 119 and in HD group was 145.4 ± 24.3 , HDL in the conservative group was 19.0 ± 6.1 and in HD group was 12.17 ± 5.1 . LS Ibels et al.¹⁵ also studied serum lipoprotein fractions in patients of CKD of conservatively managed group and those on maintenance hemodialysis (HD). The total cholesterol in the conservative group was 236 ± 24 and in HD group was 216 ± 57 , triglycerides in the conservative group was 273 ± 57 and in HD group was 237 ± 112 , HDL in the conservative group was 22 ± 6 and in HD group was 24 ± 9 , LDL in the conservative group was 131 ± 42 and in HD group was

116 ± 34 and VLDL in the conservative group was 55 ± 40 and in HD group was 47 ± 28 . In the present study total cholesterol in the conservative group was 191.99 ± 50.73 and in HD group was 179.826 ± 31.66 , triglycerides in the conservative group was 155.176 ± 47 and in HD group was 199.01 ± 70 , HDL in the conservative group was 36.1 ± 5.76 and in HD group was 35.7 ± 5.20 , LDL in the conservative group was 125.38 ± 44.3 and in HD group was 104.87 ± 25.10 and VLDL in the conservative group was 31.27 ± 9.525 and in HD group was 39.82 ± 14 . The important finding in the present study was significant increase in triglycerides in the patients on hemodialysis.

CONCLUSION

One of the known metabolic changes associated with CKD is lipid disorders. Significant increase in TG, VLDL and reduction in HDL and HDL/total cholesterol ratio have been reported in various previous studies and the present study too has observed the same results. Dyslipidemias are the important predictive indices for the risk of developing coronary artery disease in chronic kidney disease patients, and so early evaluation and treatment of dyslipidemia may improve the cardiovascular outcome.

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REFERENCE

1. King W. MA, Edward L. Greene, Leopold Raij. Cardiovascular risk factors in chronic renal failure and hemodialysis populations. *Am J kidney Dis* 1992;6:505-513.
2. Eggers PW. Mortality rates among dialysis patients in Medicare's end-stage renal disease program. *Am J. kidney Dis* 1990;15:414-421.
3. Rostand SG, Kirk KA, Rutsky EA. Relationship of coronary risk factors to hemodialysis-associated ischemic heart disease. *Kidney Int* 1982;22:304-308.

4. Lidner A, Charra B, Sherrard D. Accelerated atherosclerosis in prolonged maintainance hemodialysis. N Engl J Med 1974;290:697-701.
5. Tetsuo Shoji, EijiIshimura, Masaaki Inaba, Tsutomu Tabata, Yoshiki Nishizawa. Atherogenic Lipoproteins in end stage renal disease. Am J kidney dis 2001;38:S30-S33.
6. Foley RN, Parfrey PS, Sarnak MJ. Clinical epidemiology of cardiovascular disease in chronic renal disease. Am J kidney dis 1998;32:S112-S119.
7. P.O Attman, Alaupovic P, M. Tavella, C Knight –Gibson C. Abnormal lipid and apolipoprotein composition of major lipoprotein density classes in patients with chronic renal failure. Nephrol dial transplant 1996;11:63-69.
8. P.O Attman, Samuelson O, Alaupovic P. Lipoprotein Metabolism and renal failure. Am J kidney dis 1993;21:573-592.
9. Attman P.O, Alaupovic P. serum apolipoprotein profiles of patients with chronic renal failure. Kidney Int 1987;32:368-375.
10. Kambiz Farbaksh, Bertam L Kasiske. Dyslipidemia in patients who have chronic kidney disease. The medical clinics of North America 2005;89:689-699.
11. Thomas Quaschnig, Vera Krane, Thomas Metzger, Christoph Wanner. Abnormalities in uremic Lipoprotein Metabolism and its impact on cardiovascular disease. Am J kidney dis 2001;38:S14-S19.
12. John D. Bagdade, John J. Albers. Plasma high density lipoprotein concentrations in chronic hemodialysis and renal transplant patients. N Engl J Med 1977;1436-39.
13. Marion Morena, Jean-Paul Cristol, thierryDantoine,Marrie-Annette Carbonneau, Bernard Descomps, Bernard Canaud et al. protective effects of highdebsnity lipoprotein against oxidative stress are impaired in haemodialysispatients. Nephrol Dial Transplant 2000;15:389-393.
14. SM Alam, AK Bhatt. Abnormal lipoprotein in uremic patients treated conservatively and by maintainance hemodialysis. J Assoc phy India 1991;99:170-171.
15. L.S Ibels, L.A Simons, J.O King, P.F Williams,F.C Neale, JH Stewart et al. Studies on the nature and causes of hyperlipidemia in uremia, maintenance dialysis and renal transplantation. Quart J Med 1975;176:601-614.

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ORIGINAL PAPER

Value of AgNOR, in Malignant Lesions of Cervix

Sonowal Basanta¹, Handique Amitabh²

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ABSTRACT

Objectives: To evaluate the correlation of AgNOR count and malignant lesions of cervix.

Methods: The material for the study was collected from patient with various lesions of cervix. After colposcopy, a cervical biopsy was done. Routine paraffin sectioning was done for these biopsy specimens. Histopathologic diagnosis was first established on these sections using the routine (H & E) stain. Then, further sections were cut from prepared blocks and were subjected to AgNOR staining technique. AgNOR count was taken as the mean number of black dots per 100 cells observed under a 100× oil immersion objective.

Results: In this series biopsy specimens were obtained and subjected to routine method of haematoxylin and eosin staining which revealed 25% to be benign and 26.6% to be cervical intraepithelial neoplasia and 48.4% cases to be carcinoma.

Conclusion: The results of the AgNOR when used can provide strength to the clinician and histopathologist in diagnosing early carcinoma in cases of suspicious cervix.

Keyword: AgNOR staining technique, malignant lesion, Cervix

INTRODUCTION

Noncommunicable diseases are emerging as important health problems with changes in the lifestyles and demographic profiles of developing countries, which demand an appropriate control program before they assume epidemic proportions. One of these is the problem of cancer. In India, cervical cancer is one of the leading causes of cancer deaths in women and is the fourth most common cancer among women all over the world.¹

In India, it is most common in Bangalore and Chennai and the second most common in Mumbai and Thiruvananthapuram, followed by Dibrugarh in the 3rd place.²

Invasive cancer of cervix has been considered a preventable cancer because it has a long pre-invasive state and treatment for pre-invasive lesion is effective. Thus, early diagnosis and essential for prevention of disease progression to invasive cancer.³ An adequate aimed biopsy and preoperative staging is necessary in deciding on treatment of these pre-invasive lesion.

In the last few decades a new technique, AgNOR technique has achieved much attention because of its special characteristic of discriminating benign lesion from malignant lesions.

Nuclear organizer regions (NOR) are loops DNA that encodes ribosomal RNA. The 10-acrocentric chromosomes in man [pairs 13, 14, 15, 21 and 22] have nuclear organizer region or [NOR] on the short arm.⁴

The amount of AgNOR staining reflects the activity of rRNA genes. Ultra structurally the silver is usually localized to the febrile component of the nucleoli.⁵

However, a recently described one-step Silver staining technique⁴ has aroused considerable interest amongst

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tumor Pathologist, with a claim that there might be a possible association between high AgNOR count and malignant transformation. Since then many workers studied AgNOR in various cervical lesions with conclusion that there was a statistically significant difference of AgNOR count in benign and malignant lesions of cervix exist.

The normal (typical) transformation zone on the cervix represents the area of physiologic (normal) metaplastic epithelium that has replaced the columnar epithelium. This site is of the greatest interest as it has the potential for developing neoplasia of the cervix. The introduction of carcinogens at this point results in an atypical transformation zone.⁶

In the present study, an attempt has been made to study the correlation of AgNOR count in the case of suspicious cervix.

MATERIALS AND METHODS

The present study was carried out in the department of pathology, Gauhati Medical College and Hospital (GMCH), Guwahati. The material for the study was collected from patients with various lesions of cervix attending the Gynae OPD of GMCH.

Scheme of study

The cases were studied in detail according to pretested proforma.

Cervical punch biopsy: The patient is put in lithotomy position and the cervix is exposed with a vaginal speculum site of the biopsy is determined by Schiller's test. Schiller's test- Grams iodine was applied to the cervix which results in mahogany brown staining of the epithelium of the portio vaginalis except in areas of carcinoma, erosion, ulceration, atrophy, hyperkeratosis, parakeratosis, metaplasia, etc. A piece of cervical epithelium and underlying stroma is removed with cervical biopsy forceps.

Cervical conization: Cervical conization is removal of a cone shaped portion of the cervix including the entire transformation zone and a variable length of a cervical canal. The procedure is carried out under general anesthesia.

Tissue processing for Histopathological examination:

Step I: A trimmed piece of tissue was kept in 10% formalin saline for over 1-2 hours for fixation. A label was attached for identification.

Step II: The formal saline was when washed running tap water for 15

Step III: Tissue was then treated with ascending grades of alcohol 50% for 2 hours, 70% for 2 hours, 90% for 2 hours, 95% for 24 hours and 95% for overnight.

Step IV: The tissue was then transferred to absolute alcohol for 2 hours, till when complete hydration was achieved.

Step V: After that the tissue was then kept in xylol for overnight.

Step VI : Again the tissue was cleaned in xylol for 2, hours and kept in paraffin bath 57°C for 4 hours with the label.

Step VII: Tissue was then taken out of the paraffin bath and block was made Luck hart's L piece by putting melted paraffin.

Step VIII: After that the block thus prepared was put in a freezer for hardening.

Step IX: After preparation of the block, it was trimmed and section was made in rotary microtome (3-5 μ) and ribbon obtained was placed in water bath at 56°C and two sections were lifted in albumenized slides each block. Two slides were than prepared, one for H & E stain and other for AgNOR staining.

Step X: Slides are kept in a incubator for over night.

AgNOR staining was done with the following reagents:

- (a) 50 silver nitrate solution
Silver nitrate -50gm.
Distilled water -100ml.
- (b) 2% gelatin solution in 1% formic acid Gelatin -2 gm
Distilled water -100gm.
To this added
Formic acid -1 ml.
Distilled water -99ml.
- (c) 5% Thiosulphate solution
Thiosulphate -5gm.
Distilled water -100ml.
- (d) Working solution
- (e) Reagent (a) + Reagent (b) in a ratio of 2.1.

AgNOR stained section was first examined under low objective and area without overlapping of cells was

selected AgNOR counting was done under oil immersion objective (X100).

AgNOR Examination: 100 cells from selected area, there is no overlapping of cells examined under oil immersion objective (100 X). All the sliver structures, which appears as brownish black dots counted (i.e. both intra and nuclei). The mean count was evaluated as below.

$$\text{Mean AgNOR count} = \frac{\text{Total No of AgNOR}}{100 \text{ cells}}$$

In case, where AgNORs appear as a cluster and cannot be counted separately it is regarded as single granule.

RESULTS AND OBSERVATION

In the present sixty biopsies of uterine cervix were studied by the AGNOR method that identifies the nuclear organizer regions. In all the cases after obtaining the biopsy specimen histological diagnosis was confirmed by routine haematoxylin and eosin method. After that next AgNOR staining was done the result was correlated with histopathological diagnosis.

Distribution of cases: In this series of biopsy specimen obtained from all the cases, were finally subjected to routine method of haematoxylin and eosin staining which revealed 25% cases to be benign, 26.6% cervical intraepithelial neoplasia and 48.4% cases to be carcinoma. The most commonly encountered benign lesion chronic, exocervicitis (46.7%) followed by endocervicitis (33.3%) and squamous metaplasia (20.0%).

Cervical intraepithelial neoplasia (CIN) grade –II was found to be common about (43.8%), followed CIN –III (37.4%) and CIN –I (18.8%).

The malignant squamous lesions are narrated in **Table 1**.

Table 1 Distribution of morphologic sub type of squamous cells carcinoma

Type of malignant squamous lesion	No of cases	Percentage
L.C.N.K	6	20.69%
K.S.C.C.	16	55.17%
S.C.C	7	24.14%
Total	29	100%

Age wise distributions of cervical lesions are shown in **Table 2**.

Table 2 Age wise distributions of cervical lesions

Age group	Benign lesion	Percentage	CIN	Percentage	Malignant	Percentage
25-34	5	33.3%	2	12.5%	2	6.9%
35-44	8	53.3%	12	75.05	11	37.9%
45-54	1	6.7	2	12.5%	9	31.1%
55-64	1	6.7%	-	-	4	13.8%
65-74	-	-	-	-	30	10.3%
Total	15	100%	16	100%	29	100%

AgNOR counting

AgNOR were visualized as brownish black both within the nucleolus (intra-nucleolar) and elsewhere in the nucleoplasm (extra-nucleolar). 100 nuclei were selected randomly and numbers of AGNOR per nucleus were calculated under X 100 oil immersion objective.

Table 3 AgNOR mean count in benign CIN and malignant lesion

Category	No of cases	AgNOR Mean count		
		Mean	S. Deviation	Range
Benign lesion	15	1.33	0.019	1.10 -1.75
CIN	16	3.90	0.044	2.88 -5.01
Malignant	29	5.6	0.016	5.04 – 7.3

AgNOR Mean counts in different morphologic subtypes of squamous cells carcinoma are shown in **Table 4**.

Table 4 AgNOR Mean counts in different morphologic subtypes of squamous cells carcinoma

Category	No of cases	AgNOR Mean count		
		Mean	S. Deviation	Range
LKSCC	16	5.71	0.549	5.06-7.3
LCNK	6	5.64	0.37	5.18-6.19
SCC	7	5.41	0.211	5.31-5.75

Significance of the test: The significance of AgNOR mean counts observed in identifying various benign, intraepithelial malignant lesion of the cervix was calculated by student's t test.

Benign lesion versus malignant lesion

$$\text{Student 't' test} = \frac{\bar{X} - \bar{Y}}{\text{SD} \sqrt{\frac{1}{n_1} + \frac{1}{n_2}}}$$

$$T = \frac{5.59 - 1.40}{0.224 \sqrt{\frac{1}{16} + \frac{1}{29}}} = \frac{4.19}{0.224} = 18.71 \quad [P < 0.0001 \text{ with } 42 \text{ d.f}]$$

The calculated value of t for d. f. has been found to be a greater the table value of t at 0.00001 level of significance i.e. < 0.00001 , which is very height significant

$$\text{Student 't' test} = \frac{X - Y}{SD \sqrt{\frac{1}{n_1} + \frac{1}{n_2}}}$$

$$T = 5.31 \frac{-2.4}{0.039} = \frac{2.91}{0.039} = 746$$

$$= 74.6 [P < .001 \text{ for } 31 \text{ d.f}]$$

Here the calculated value of t for 31 d. f. has been found to be greater the table value of t at 0.001 level of significance, i.e., $P < 0.001$ which is very highly significant.

CIN lesion versus malignant lesion

$$\text{Student 't' test} = \frac{X - Y}{SD \sqrt{\frac{1}{n_1} + \frac{1}{n_2}}}$$

$$T = 5.59 \frac{-5.31}{0.228} = \frac{0.28}{0.228} = 1.22 [P < \text{for d.f. } 45]$$

As $P < 01$ for 45 d. f. the test is highly significant.

The AgNOR mane count in benign lesion to be 1.5 (Range 1.1 -1.75 S.D. 0.57 and CIN 3.7 (range 2.8 -4.98, SD -6019] and malignant lesion 5.6 (range 5.06 6.16, SD 0.37]. In this of study cut off point for malignant lesion was set up 4

There was no significant difference in AgNOR count between squamous metaplasia and chronic cervicitis. The AgNOR mean count per nucleus significantly higher in CIN and malignant lesion as compared to benign lesion No significant different were noted between CIN II and III and different morphologic subtype of squamous carcinomas.

DISCUSSION

Cervical cancer is both preventable and curable if detected early in preinvasive or at an early invasive stage by screening procedures as it has a well-defined natural history and a long detectable preclinical phase. If detected and treated early in the preinvasive and early invasive stages, the disease has virtually a 100 % cure rate. However, in advanced cancers, the 5-year survival rate drops to less than 35 %. In countries where cervical programs have been established, the incidence of cervical cancer has markedly decreased.⁷

Among the benign lesions in my study chronic cervicitis, ectocervix (46.7%) was most commonly encountered. This was followed by endocervicitis 5 cases (33.3%) and

squamous metaplasia 3 cases (20.0%). In some cases neobothian follicles formation was also seen unlike invasive carcinoma, epithelium in chronic cervicitis was found to be intact. In some cases necrosis and granulation tissue formation was also seen. In a total of 15 cases, 1 case initially was diagnosed as CIN-I and due to presence of nuclear atypia that later was excluded after examining serial section and diagnosed finally as chronic cervicitis (Ectocervix). The atypia was due to chronic inflammation (inflammatory atypia). Three cases diagnosed as squamous metaplasia; metaplastic epithelium observed was matured with an appearance indistinguishable from native squamous epithelium. Nabothian cyst formation was observed in all those three cases.

Cervical biopsy and AgNOR count add to the diagnostic accuracy. The number and size of NOR dots in the malignant cells are significantly different from those in normal and benign cells and reflect the current phase of transcription of the cells.

Out of 60 cases, 16 cases were **Cervical Intraepithelial Neoplasia (CIN)** category. 18.8% cases as CIN—I, 43.8% cases as CIN-II, 37.4% cases as CIN—III. The cases of CIN were observed mostly in the epithelial of the transformation zone.

AgNOR counts have been reported to consists in the distinction between high grade and low grade lymphoma, benign melanocytic lesion and malignant melanoma⁸, various type of small round cell tumor of childhood⁹, reactive mesothelial proliferative and mesothelioma, normal, cirrhotic and carcinoma of liver, distinction between oat cell and lymphocytes. The increased AgNOR count reflects increased cellular proliferative activity of cells.

In this study the AgNOR mean count in chronic cervicitis, ectocervix was found to be 1.33. The AgNOR within the nucleus are usually small and rounded. Present study correlated with Allen JP.¹⁰ The AgNOR count in CIN lesion was found to the 3.7, the finding of which are tallied with Egan M⁹ and others.¹⁰

In this study, out 60 cases 49.4% cases were found to be malignant. The mean AgNOR score in our study was 1.33 in chronic cervicitis, 1.55 in mild dysplasia, 3.7 in CIN lesion showing a progressive increase in the score. The differences in the AgNOR count between CIN-I and CIN-II and between CIN-II and CIN-III and between CIN-III and CIN-I were statistically significant. Egan et al.⁹ observed that the mean AgNOR count increased steadily, whereas the mean size of the AgNOR dots decreased from CIN-I to CIN-III.

An Indian study done by Pratibha and Kuruvilla¹¹ on the role of AgNOR in diagnosing premalignant and malignant lesions of the cervix showed that the mean AgNOR count progressively increased from normal to CIN-I, CIN-II, CIN-III, and invasive carcinoma. The mean AgNOR per nucleus was 1.2, 1.8, 3.0 and 4.3 in the Normal cervix, CIN-I, II then CIN-III, and squamous cell carcinoma, respectively, in their study. The difference between counts in CIN-I and CIN-II and in the normal cervix and between counts in CIN-III and in invasive cancer was statistically significant.

Our figures matched with the AgNOR per cell quoted by Kaushik et al.¹² and Pratibha and Kuruvilla¹¹ for CIN-I, CIN-II, and III. But, for the AgNOR count in the normal cervix and in squamous cell carcinoma, our figures matched with Kaushik et al. The AgNOR count reported by Pratibha and Kuruvilla was higher (7.35) as compared to our figure, i.e., (3.7). The AgNOR count showed an increase from CIN to SCC in our study.

Correlation of AgNOR means count in benign and malignant lesion in present study series.

Student t test was performed and it was found that calculated value of t for 42 d.f. has been found to be greater than table value of t at 0.0001 level of significance i.e. $P < 0.0001$ which is very highly significant.

CONCLUSION

AgNOR method is a good method of screening cases of suspicious cervix and its diagnostic efficacy can be improved with the help of the AgNOR count. This simple silver staining technique can be used as an adjunct to routine histopathologic examination especially for grading dysplasia, thus rendering earlier diagnosis and treatment. AgNOR count can be used to assess the cellular proliferation rate, as there is an increase in the AgNOR count from chronic cervicitis to dysplasia and malignancy. To conclude, the results of AgNOR when used can provide strength to the clinician and histopathologist in diagnosing early carcinoma in cases of suspicious cervix.

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REFERENCE

1. Parkin DM, Bray F, Ferlay J. Estimating the world cancer burden. *Int J Cancer* 2001;94:153–156.
2. NRCP consolidated report of hospital based cancer registry program (2001–2003), 2007.
3. Neville F. Hacker. *Practical Gynecologic Oncology*. 4th ed. Lippincott Williams and Wilkins; 2004. p. 840.
4. Ploton D. Improvement in the staining and in the visualization of argyrophilic protein neither of NOR at the optical level. *Histochem J* 1986;18:5-14.
5. Schwarzscher HG, Mikelsaar AV and Schnedl W. The nature of the nucleolus organizers regions: Electron and light microscopic studies on human cells in interphase, mitosis and meiosis. *Cytogenet Cell Genet* 1978;20:24.
6. Baliga BS. *Principles and practice of colposcopy*, Vol. I.
7. Christine B, Johney A, Sylvie A. Cervical smear: histories of 585 women with biopsy proven carcinoma in situ. *Acta Cytol* 1997;41:1676–1680.
8. Crocker J Nar P. Nuclear Organizer regions in Lymphomas. *J Pathol* 1987;157:151:154.
9. Egan M, Freeth M, Croker J. Relationship between intraepithelial neoplasia of the cervix and the size and number of nucleolar organizers regions. *Gynecol Oncol* 1990;36: 147–151.
10. Allen JP, Gallimore AP. Nucleolar organizer regions in benign and malignant glandular lesions of the cervix. *J pathol* 166:153- 56, 1992.
11. Pratibha D, Kuruvilla S. Value of AgNORs in premalignant and malignant lesions of cervix. *Indian J Pathol Microbiol* 1995;38(1):11–16.
12. Kaushik R, Sharma V, Gulati A, et al. AgNOR counts in cervical lesions. *Indian J Pathol Microbiol* 2003;46(2):201–203.

ORIGINAL PAPER

Frontal Skull-Base Meningioma: Its Management and Outcome

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ABSTRACT

Objective: To analyze the clinical manifestations, diagnostic evaluation and the functional outcome of surgery of anterior skull base meningioma. **Material and method:** It is a prospective hospital based study on 22 patients who were admitted and diagnosed to be a case of anterior skull base meningioma and have completed at least three months of follow-up after surgery. **Result:** Anterior skull base meningioma is commonly seen in the female population with a female to male ratio of 1.75:1. Maximum incidence was found in the age group of 40 to 50 years of age. Visual impairment was the most common (59.1%) mode of presentation. Due to the involvement of the other cranial nerves of anterior cranial fossa, diplopia (22.7%), ocular paresis (22.7%), papilledema (50%), optic atrophy (31.8%), Foster Kennedy Syndrome (13.6%), anosmia (22.7%) are common findings. Due to the mass effect, headache (54.5%), mental changes (27.3%), seizure (22.7%) are also commonly found. Computerized tomography scanning was useful for defining the osseous anatomy while MR imaging and MR angiography defined the relationship of the tumor to the optic nerves and chiasm as well as the other intracranial neurovascular structures. **Conclusion:** Thus early diagnosis is desirable for successful treatment with a better chance of good postoperative outcome.

Keywords: Frontal Skull, Meningioma, Outcome

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INTRODUCTION

Meningioma is among the most common intracranial neoplasms of adulthood and is the most common primary intracranial tumour. They are usually slow growing, circumscribed benign neoplasms. They account for 18-20% of all primary intracranial neoplasm and among them around 25% arise from the anterior skull base. Any person treated with radiotherapy of the scalp or cranium are more prone to develop meningiomas and also appear at an earlier age.¹ There are number of reports of meningioma developing at the site of previous trauma and also of genetic influence in its development. Although, meningiomas are usually well circumscribed, an uncommon en-plaque variety is also seen and they commonly arise along the skull base.²

Meningiomas are commonly seen between 20 to 60 years of age, the peak being around the age of 40 and are common in women than in men (2:1). While many tumours are asymptomatic and remain so throughout life, meningiomas of the anterior skull base will frequently cause visual or oculomotor disturbances that lead to their early diagnosis. Patients with anterior skull base meningioma may present with variety of symptoms – raised intra-cranial pressure, lobar symptoms, multiple cranial nerves involvement, ocular manifestations, bony hyperostosis and involvement of other intra-cranial structures. Radiologically, they are best evaluated by CECT head and CEMRI brain to look for bony involvement as well as extent of the tumour, dural and other neurovascular involvement.³

The treatment of meningioma is surgical resection. Complete tumour resection along with removal of other

involved intracranial structure is important to prevent recurrence. As many cranial nerves and other important intracranial structures are located along the anterior skull base, clear anatomical knowledge of the region and surgical skill are of paramount importance for complete tumour resection and better surgical outcome. Radiotherapy is included for incompletely resected tumours or recurrent disease for better results.⁴

Due to the complexity of the anatomy of the anterior cranial fossa, the outcome of surgery along the anterior skull base depends upon the tumour location and its involvement of other intracranial structures, surgical approach, surgical expertise and prevention of intra and post-operative complications. With better understanding of the anatomy, preoperative clinical and diagnostic evaluations and proper microsurgical techniques, we can achieve good clinical and functional outcomes following surgery⁵ and the same is approached in this study.

Material and method:

It is a prospective hospital based study on 22 patients who were admitted and diagnosed to be a case of anterior skull base meningioma in the department of Neurosurgery, Gauhati Medical College and Hospital, Guwahati during the period of January 2012 to December 2013 and have completed at least three months of follow-up after surgery.

RESULTS

In this study, emphasis was put on the clinical presentations, clinical and radiological findings, surgical approaches undertaken according to tumor locations and outcome of surgery in patients with anterior skull base meningioma.

Anterior skull base meningioma is commonly seen in the female population with a female to male ratio of 1.75:1. Maximum incidence was found in the age group of 40 to 50 years of age.

Visual impairment was the most common (59.1%) mode of presentation. Due to the involvement of the other cranial nerves of anterior cranial fossa, Diplopia (22.7%), ocular paresis (22.7%), Papilledema (50%), optic atrophy (31.8%), Foster Kennedy Syndrome (13.6%), Anosmia (22.7%) are common findings. Due to the mass effect, headache (54.5%), mental changes (27.3%), seizure (22.7%) are also commonly found.

Different sites of origin of anterior skull base meningioma are shown in **Table 1**.

Table 1 Tumor Location

Origin of tumor	No. of cases (%)		
Sphenoid wing	Lateral 1/3 rd	3(13.6%)	7 (31.8%)
	Middle 1/3 rd	2 (9%)	
	Medial 1/3 rd	2 (9%)	
Olfactory groove		5 (22.7%)	
Optic nerve sheath & orbital		4 (18.2%)	
Tuberculum sellae		5 (22.7%)	
Planum sphenoidale		1 (4.5%)	

Tumour was approached through the Unilateral sub frontal approach in 31.8% cases, Fronto- Temporo- Orbito- Zygomatic approach in 27.3% cases, Bilateral subfrontal approach in 22.7% cases and Pterional approach in 18.2% cases. Most of the tumours were approached through the unilateral subfrontal approach (31.8%). The next common route was through the fronto-temporo-orbito-zygomatic approach (27.3%). In 77.3% patients, total tumour resection (Simpson Grade I & II) could be achieved. In rest of the 22.7% of cases, gross total resection of tumour was done.

Post-operatively, the most common complication was the frontal lobe contusion/edema and subdural hygroma (18.2% of patients each). Frontal lobe contusion/edema was most commonly seen in unilateral subfrontal approach (42.9% patients of this group).

Histopathologically, 90.9% of the tumour was of WHO Grade I. Before discharge and during each follow-up, the patients were re-evaluated in detail by history and neurological examinations to know the improvement or deterioration of the clinical and functional status. Post-operative CECT head or CEMRI brain were done before discharge from the hospital, at 3 months and yearly thereafter.

Among the 13 patients presenting with visual symptoms, the vision improved post-operatively in 61.5% cases (**Table 2**).

Table 2 Pre and postoperative visual field status in tumour subsets

Tumor Origin	Presentation With Visual Field Deficits			
	No. of Patients	Postoperative Visual Status		
		Improved	Same	Deteriorated
Sphenoid Wing	2 of 7 (28.6%)	2 of 2 (100%)	-	-
Olfactory Groove	1 of 5 (20%)	1 of 1 (100%)	-	-
Optic Nerve Sheath & Orbital	4 of 4 (100%)	1 of 4 (25%)	2 of 4 (50%)	1 of 4 (25%)
Tuberculum Sellae	5 of 5 (100%)	4 of 5 (80%)	1 of 5 (20%)	-
Planum Sphenoidale	1 of 1 (100%)	-	1 of 1 (100%)	-
TOTAL	13 of 22 (59%)	8 of 13 (61.5%)	4 of 13 (30.8%)	1 of 13 (7.7%)

Post-operatively seizure in the five cases was controlled. But in one patient of olfactory groove meningioma, there was new onset seizure during the post-operative period.

Table 3 Pre And Postoperative Karnofsky Performance Status & Glasgow Outcome Scale Of Patients

Preof KPS	KPS 3 month	KPS 6 month	KPS 3 month	KPS 6 month
80	80	90	5	5
90	90	90	5	5
70	80	90	5	5
70	80	90	5	5
80	90	100	5	5
60	80	90	5	5
70	70	70	4	4
70	80	100	5	5
80	80	90	5	5
80	80	90	5	5
70	80	90	5	5
70	90	80	5	5
80	70	70	4	4
70	80	90	5	5
70	80	90	5	5
90	100	100	5	5
60	0	0	1	1
80	90	90	5	5
70	80	Yet to do	5	Yet to do
80	90	Yet to do	5	Yet to do
60	70	Yet to do	4	Yet to do
90	90	Yet to do	5	Yet to do

DISCUSSION

Anterior skull base meningioma are mostly seen among the female population in the age group from 40 to 50 years in this study. Previous studies also found similar results with a maximal incidence in the 4th and 5th decades of life.⁶

Anterior skull base meningiomas give rise to an early visual pathology with relatively slow progression, but due to the fact that other symptoms are missing or are subtle, they have a larger tendency to remain undiagnosed for longer periods of time.^{7, 8} Optic nerve compressions is variable depending on the size and the location of the tumor; bilateral optic nerve involvement and optic chiasm compression further add to the complexity of the surgical decision-making process.⁹⁻¹² Optic canal involvement by these tumors is not rare, and reports have described unilateral or bilateral optic canal extension. The most common presentation was visual disturbance (59.1%) in our series. Due to involvement of ocular motor nerves (CN III, IV & VI), 22.7% patients had ocular paresis and diplopia. Although headache and other features of raised ICP are usually less common mode of presentation in meningioma as of anterior skull base,^{7, 8} we have found headache in 54% of our cases.

CT scanning is particularly useful for defining the osseous anatomy, including areas of hyperostosis or erosion that may assist in the diagnosis or planning of a surgical approach to these lesions. Both MR imaging and MR angiography defines the relationship of the tumor to the optic nerves and chiasm as well as the ACAs and communicating complex.

The advantage of the bifrontal craniotomy with subfrontal approach is described in many papers.¹³⁻¹⁷ This approach provides excellent opportunity for radical tumour resection, drilling of hyperostosis in the anterior skull base and unroofing of optic nerves when necessary. Chances of opening up of frontal sinus are high through this approach with subsequent CSF leak and meningitis. Bilateral subfrontal approach was used in 5 patients of our series who had large tumor size and not suitable for resection by unilateral approach. Total excision of tumour (Simpson Gr I & Gr II) was achieved in 3 cases. Gross total resection was done in two cases as the tumor was encasing the optic chiasma and ACA.

Unilateral sub-frontal approach was used in 31.8% cases. Simpson Gr. I resection was achieved in 2 cases and Gr. II excision in rest of the 5 cases. The disadvantage was

that it required lot of brain retraction and the incidence of post-operative brain edema and contusion was high (42.9%) in unilateral subfrontal group like that of in previous studies.¹⁸⁻²⁰

The pterional approach was first popularised by Yasargil²¹ and has been used to treat various pathological conditions in skull base. Our rationale to use this approach is a consideration of taking advantages of natural planes and spaces in which nature has provided to expose the base of the brain without significant brain retraction. The advantages of pterional approach are early visualization of optic apparatus and internal carotid artery (ICA), attacking side is on the more severe optic nerve palsy, shorter distance to sellar region, and less retraction of frontal lobe.²⁰ The disadvantages of pterional approach are narrow space and angle, and risk of profuse bleeding when removing the tumor.¹⁸⁻²¹

The fronto-temporo-orbito-zygomatic (FTOZ) approach provides a direct angle of attack and improved tumour exposure, as proven by Schwartz *et al.*²² It is best suitable for tumour originating or extending into the orbit. Proper excision of both intracranial and orbital part of the tumour can be achieved through this basal approach. In our series, we performed 6 operations through this approach. Total excision was done in 3 cases. In rest of the 3 cases total excision could not be done because of the encasement of the optic nerve by the tumour.

In our study, total resection of tumour was achieved in 77.3% cases. In this group of patients, tumour was either approached through unilateral subfrontal or pterional approach. The main reason of gross total resection (simpson Gr III, Gr. IV & Gr. V) in remaining 22.7% cases was due to the tumor encasement of the optic nerve, chiasma or tract and involvement of major vessels (ACA, ICA or AcomA). Tumor removal achieved (77.3%) is well between the described 56 to 100% margins found in the literature.^{12, 23} It should be mentioned that even though complete tumor removal was the proposed surgical target for all the surgical interventions in our study we feel that this should not be imperative and be performed at the expense of higher morbidity. In our study, three patients (13.6%) patients got post-operative radiotherapy. With current microsurgical techniques, the complication rates associated with skull base meningioma resection is very low. Mortality rates in the literature vary from 0%^{15, 24-27} to 17%²⁸ and even 22.7%.²⁹

The objective of anterior skull base meningioma surgery

is to remove the tumour pathology and preserve or improve the functional status of the patient. Improvement of visual function, according to several reports, varies from 32% to 91%.^{7,19,30,31} In our study group, 13 patients (59%) presented with decreased vision. Post-operatively, 8 (61.5%) of them had improved vision, in 4 patients (30.8%), vision remained same and in one case (7.7%), the vision deteriorated. This finding is similar to microsurgical series presented in the literature.²³ Important finding was that, all the patients presenting within 6 months of onset of visual symptoms had improved vision. Patients presenting 6 months or later, the visual outcome was not favourable. In most of them the vision remained same as in pre-operative status.

The functional outcome was assessed on the basis of Karnofsky Performance Scale (KPS) and Glasgow Outcome Scale (GOS). Although GOS is meant for assessment of outcome in head injury patient, we have compared the outcome scores of KPS to GOS and assessed the functional outcome following surgery accordingly. The functional outcome was assessed during the follow-ups of patients and based on the clinical evaluation, cognitive, physical, emotional, and social functioning after surgery. We have found that during the first 6 months after surgery there was a gradual improvement in quality of life measures, while later on no significant change in was reported by the patients or their family members. This dynamic change in quality of life measures after anterior skull base meningioma surgery was similar to that found by De Jesus *et al.*³² for meningiomas involving the cavernous sinus.

CONCLUSION

Thus, favourable functional outcome can be anticipated in anterior skull base meningioma by early diagnosis, good neurological evaluation and proper microsurgical techniques. The most successful predictor for outcome is the extent of neurological compromise at the time of presentation and diagnosis. Thus, early diagnosis is desirable for successful treatment with a better chance of good postoperative outcome. Major advances in diagnostic evaluations and microsurgical techniques over the last few decades have raised the survival rates and functional outcome of surgery in patients with anterior skull base meningioma.

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REFERENCES

1. Ropper AH, Brown RH, editors. Intracranial neoplasms and paraneoplastic disorders. In: Adams and Victor's principles of neurology. 8th ed. New York (NY): McGraw-Hill; 2005:558-91.
2. Watts J, Box G, Galvin A, Brochie P, Trost N, Sutherland T. Magnetic resonance imaging of meningiomas: a pictorial review. *Insights Imaging* 2014;5:113-22.
3. Raut AA, Naphade PS, Chawla A. Imaging of skull base: Pictorial essay. *Indian J Radiol Imaging* 2012;22:305-16.
4. Subramanian PS. Advances in the management of skull base meningioma. *North American Neuro-Ophthalmology Society: Annual Meeting Syllabus*; 2012:379-85.
5. Liu X, Zhang Y, Hui X, You C, Yuan F, Chen W, *et al.* Surgical management of medulla oblongata hemangioblastomas in one institution: an analysis of 62 cases. *Int J Clin Exp Med.* 2015;8:5576-90.
6. Mourits MP, van der Sprenkel JW. Orbital meningioma, the Utrecht experience. *Orbit.* 2001;20:25-33.
7. Fahlbusch R, Schott W. Pterional surgery of meningiomas of the tuberculum sellae and planum sphenoidale: surgical results with special consideration of ophthalmological and endocrinological outcomes. *J Neurosurg.* 2002;96:235-43.
8. Jallo GI, Benjamin V. Tuberculum sellae meningiomas: microsurgical anatomy and surgical technique. *Neurosurgery.* 2002;51:1432-39; discussion 1439-40.
9. Al-Mefty O. *Operative atlas of meningiomas.* Philadelphia: Lippincott-Raven; 1998.
10. Al-Mefty O, Smith R. Tuberculum sellae meningiomas. In: Al-Mefty O, editor. *Meningiomas.* New York: Raven Press; 1991:395-411.
11. Chi JH, McDermott MW. Tuberculum sellae meningiomas. *Neurosurg Focus.* 2003;14:e6.
12. Goel A, Muzumdar D, Desai KI. Tuberculum sellae meningioma: a report on management on the basis of a surgical experience with 70 patients. *Neurosurgery.* 2002;51:1358-63; discussion 1363-4.
13. El Gindi S. Olfactory groove meningioma: surgical techniques and pitfalls. *Surg Neurol.* 2000;54:415-7.
14. Mayfrank L, Gilsbach JM. Interhemispheric approach for microsurgical removal of olfactory groove meningiomas. *Br J Neurosurg.* 1996;10:541-5.
15. Obeid F, Al-Mefty O. Recurrence of olfactory groove meningiomas. *Neurosurgery.* 2003;53:534-42; discussion 542-3.
16. Ojemann RG. Olfactory groove meningiomas. In: Al-Mefty O, editor. *Meningiomas.* New York: Raven Press; 1991:383-92.
17. Ransohoff J, Nockels R. Olfactory groove and planum meningiomas. In: Apuzzo M, editor. *Brain surgery: complication avoidance and management.* New York: Churchill Livingstone; 1993:177-85.
18. Knosp E. Practical handbook of neurosurgery from leading neurosurgeons. In: Sindou M, editor. New York: Springer Verlag; 2009:79-94.
19. Nakamura M, Roser F, Struck M, Vorkapic P, Samii M. Tuberculum sellae meningiomas: clinical outcome considering different surgical approaches. *Neurosurgery.* 2006;59:1019-28; discussion 1028-9.
20. Benjamin V, Russell SM. The microsurgical nuances of resecting tuberculum sellae meningiomas. *Neurosurgery.* 2005;56(2 Suppl):411-7; discussion 411-7.
21. Yasargil MG. *Microneurosurgery.* In: Yasargil MG, editor. Stuttgart: George Thieme Verlag; 1984:215-20.
22. Schwartz MS, Anderson GJ, Horgan MA, Kellogg JX, McMenomey SO, Delashaw JB Jr. Quantification of increased exposure resulting from orbital rim and orbitozygomatic osteotomy via the frontotemporal transsylvian approach. *J Neurosurg.* 1999;91:1020-6.
23. de Divitiis E, Cavallo LM, Esposito F, Stella L, Messina A. Extended endoscopic transsphenoidal approach for tuberculum sellae meningiomas. *Neurosurgery.* 2008;62(6 Suppl 3):1192-201.
24. Hentschel SJ, DeMonte F. Olfactory groove meningiomas. *Neurosurg Focus.* 2003;14:e4.
25. Ojemann RG, Swan K. Surgical management of olfactory groove, suprasellar and medial sphenoid ridge meningiomas. In: Schmidek HH, Sweet WH, editors. *Operative neurosurgical techniques.* Orlando, Grune & Stratton; 1988:531-45.
26. Samii M, Ammirati M. Olfactory groove meningiomas. In: Samii M, editor. *Surgery of the skull base: meningiomas.* Berlin: Springer-Verlag; 1992:15-25.
27. Turazzi S, Cristofori L, Gambin R, Bricolo A. The pterional approach for the microsurgical removal of olfactory groove meningiomas. *Neurosurgery.* 1999;45:821-5; discussion 825-6.
28. Solero CL, Giombini S, Morello G. Suprasellar and olfactory meningiomas. Report on a series of 153 personal cases. *Acta Neurochir (Wien).* 1983;67:181-94.
29. Cushing H, Eisenhardt L. *The meningiomas: their classification, regional behavior, life history, and surgical end results.* Springfield, IL: Charles C. Thomas; 1938.
30. Margalit N, Kesler A, Ezer H, Freedman S, Ram Z. Tuberculum and diaphragma sella meningioma—surgical technique and visual outcome in a series of 20 cases operated over a 2.5-year period. *Acta Neurochir (Wien).* 2007;149:1199-204; discussion 204.
31. Schick U, Hassler W. Surgical management of tuberculum sellae meningiomas: involvement of the optic canal and visual outcome. *J Neurol Neurosurg Psychiatry.* 2005;76:977-83.
32. De Jesús O, Sekhar LN, Parikh HK, Wright DC, Wagner DP. Long-term follow-up of patients with meningiomas involving the cavernous sinus: recurrence, progression, and quality of life. *Neurosurgery.* 1996;39:915-9; discussion 919-20.

ORIGINAL PAPER

Seroprevalence of Hepatitis D Virus in Patients with Hepatitis B Virus-Related Liver Diseases

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ABSTRACT

Purpose: Hepatitis D Virus (HDV) infects patients that are already infected by hepatitis B virus (HBV). There is lack of data on the impact of Hepatitis D Virus (HDV) in patients with hepatitis B virus (HBV) in central Assam. This study was aimed at determining the seroprevalence of Hepatitis D Virus (HDV) in central Assam and does studies on HDV among Hepatitis B patients.

Methods: This study was carried out at a tertiary hospital. Out of 89 hepatitis B surface antigen (HBsAg) positive patients 44 were cases of acute viral hepatitis (AVH), 12 were fulminant hepatic failure (FHF), 19 were chronic hepatitis (CH), 12 were cirrhosis and 2 cases were hepatocellular carcinomas (HCC).

Results: Among 89 HBsAg positive patients 1 patient had showed positive for anti-HDV ELISA. Low prevalence rate was found in a middle aged business man. HBV and HDV infections together cause more severe liver damage.

Conclusion: Although many scholars have studied various aspects of Hepatitis delta virus infection including seroprevalence in India with different types of hepatitis related liver diseases, this study was to evaluate the seroprevalence of HDV infection patient with HBsAg carriers attending in Gauhati medical college and hospital "between" July 2006 to June 2007 A.D. The HDV infection is not uncommon.

Keywords: Hepatitis B virus, Hepatitis D Virus, HBsAg, anti HD antibody, Anti-HDV ELISA, liver cirrhosis, hepatocellular carcinoma

INTRODUCTION

Hepatitis is a general term meaning inflammation of the liver. Hepatitis can be caused by a variety of hepatotropic viruses such as Hepatitis A, B, C, D, E, and G either alone or in concert. Infection with hepatotropic viruses results in acute viral hepatitis, chronic viral hepatitis or fulminant hepatic failure.¹ Hepatitis delta virus (HDV) is a member of group V, Genus Delta virus, and species Hepatitis delta virus.

The HDV genome consisted of a single stranded circular RNA structure and is able to fold on itself, with Watson and crick base pairing of approximately 70% of the nucleotides.² The surface protein of Hepatitis B virus (HBV) was discovered accidentally in 1965 during the search by an anthropology for polymorphic serum protein as genetic markers in the blood of an Australian aborigine and was called Australian antigen. Rizzetto had discovered two years later the association between the occurrence of the Australian antigen and serum hepatitis was detected.³

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Hepatitis delta virus and co-worker while they studied liver biopsy of patient of chronic liver diseases with positive hepatitis B surface antigen (HBsAg).

At first, Hepatitis delta virus infection was described in HBsAg carrier from southern Italy.⁴ Hepatitis D or Delta hepatitis is caused by the hepatitis delta virus (HDV). HDV requires help of a hepadna virus like hepatitis B virus (HBV) for its own replication.² Eight phylogenetically distinct genotypes of HDV have been reported. Various genotypes are reported to be associated with different long term outcomes of infection. Genotype 1 is the most frequent and found in Europe, Middle East, North America and North Africa; Genotype 2 is seen in the Far East; Genotype 3 was reported in the Amazonian region of South America; Genotype 4 was isolated in Taiwan and Japan; and Genotype 5 to 8 have been identified in Africans.^{5,6}

The single-stranded RNA genome of HDV is in several ways fundamentally different from other RNA viruses of animals.⁷

1. The RNA genome approximately 1700 nucleotides (nt), it is the smallest.
2. The genome has a circular conformation whereas the other viral genomes are linear.
3. The circle is able to fold on itself, with Watson and Crick base pairing of approximately 70 percent of the nucleotides, forming an unbranched rod-like structure.
4. On the genome is a domain of about 85 nt, which acts as a self-cleaving ribozyme.

To establish in vivo, HDV depends on helper functions provided by hepatitis B virus. The HDV virion is composed of the RNA genome and a hepatitis delta antigen (HDAg), both enveloped by HBsAg.⁷ Several reports had indicated a declining trend in the occurrence of HDV infection in some geographical areas.⁸⁻¹¹ For example, while HDV was responsible for a high proportion of cases of acute and chronic liver disease in Southern Europe during the 1970s, its seroprevalence was reported to have declined substantially in 1997.^{10, 12} Huo et al^{11, 12} from Taiwan have reported a decrease in HDV infection in hepatitis B surface antigen (HBsAg) carriers from 23.7 in 1983 to 4.2 per cent in 1995.

The prevalence of hepatitis D shows a decreasing trend due to preventive measures like vaccination against hepatitis B and awareness campaigns with regard to risk

factors for the transmission of hepatitis B and D. Although preventive measures against hepatitis B including vaccination have decreased the prevalence of hepatitis D, there is no effective way of preventing HDV infection in HBV carriers in endemic areas. This can only be achieved by educating such individuals to prevent further exposures to risk factors.¹³ In spite of the global trend of decline, significant and persistent transmission is present in some countries.

MATERIAL AND METHODS

This study was to evaluate the seroprevalence of HDV infection patient with hepatitis B surface antigen (HBsAg) carriers attending in Gauhati Medical College and hospital “between” July 2006 to June 2007. A total of 89 hepatitis B surface antigen (HBsAg) positive patients with liver diseases attending Gauhati Medical College and hospital, Guwahati, Central Assam were included. These comprised 44 cases of acute viral hepatitis (AVH), 12 of fulminant hepatic failure (FHF), 19 of chronic hepatitis (CH), 12 of cirrhosis and 2 cases of hepatocellular carcinoma (HCC).

All patients were screened for HBV infection, which was established by positivity for surface antigen HBsAg. Under all aseptic care 5 ml of venous blood was collected in a sterile vial from the patient. Blood allow to clotting at room temperature. Serum is separated by centrifugation at 3000 rpm for 5 minutes and labelled the serum sample were stored at -70° c. Serum sample was tested by competitive enzyme linked immunoassay for Anti-HDV (IgG) to hepatitis using commercially available kit manufactured by Smartest Diagnostics (M/S organics Ltd) , Israel with lot number 252046.

The serum samples were collected from 76 male and 13 female patients. Out of 89 HBV samples, 50 urban and 39 were from rural areas. The 89 HBV samples are broadly grouped into 5 groups. Out of 89 HBV samples 19 were students, 15 were engaged in services, 25 were businessman, 20 farmers, and 10 were housewives. HBsAg was detected by Hep-Alert rapid immunochromatographic card test (Ranbaxy Diagnostics, New Delhi, India) in human serum or plasma. The Competitive Enzyme linked immunoassay for Anti-HDV (IgG) to hepatitis Delta had > 98 % sensitivity and >98% specificity.

OBSERVATION AND RESULTS

In this study a total of 89 cases of HBV related acute and chronic liver disease serum samples were collected. There were 76 males (85.39%) and 13 females (14.60%) included

in this 89 HBsAg serum positive cases. The male and female ratio is 5.84:1. This study group comprised of 44 patients with acute viral hepatitis (AVH), 12 patients with fulminant hepatitis, 19 patients with chronic active hepatitis (CH), 12 patients with cirrhosis (CRR) of liver and 2 patients with hepatocellular carcinoma (HCC). All the acute and chronic liver diseases were HBsAg positive.

ELISA tested the serological and clinically diagnosed 89 HBsAg positive serum samples for detection of hepatitis D virus antibody. Among the total of 89 HBV samples 50 (56.17%) were from urban and 39(43.82%) were from rural areas. The cases are broadly grouped into 5 groups. Among them 19 were students, 15 were engaged in services, 25 were businessman, 20 farmers, 10 were housewives.

Table 1 Prevalence of HDV

Total number of case	HDV positive case	HDV negative case
89	01 (1.12%)	88 (98.87%)

Only 01(one) HDV seropositive case between 21-40 years age group was found with occupation of business. Among the total 89 samples only one HDV (1.12%) positive case and other 88 HDV (98.87%) negative cases were included in this study (**Table 1**). The HDV seropositive was found in 21 to 40 years age group. The age and HBV-HDV distribution are shown in **Table 2**.

Table 2 Age and HBV & HDV positive distribution

Age (Years)	HBV case	HDV CASE
0-20	5	0
21-40	50	1
41-60	32	0
>60	2	0

DISCUSSION

With the introduction of specific serological markers for Hepatitis A, B, or D and E infection, it is now possible to differentiate type A, type B, type C or type D infection from those with presumed non-A, non-B infection. In the present study 89 patients of various HBV-related liver diseases were studied for the presence of delta antibody.

The prevalence of delta infection in the present study was found to be 1.12% (1/89). Jain et al, 2013 had showed zero (0%) percentage HDV prevalence in North India among 43 HBV positive patient.¹⁴ Li J, Wang J, Tian K, Wang Y, Zhang L, Huang H have conducted an epidemiological survey of hepatitis D viruses in IVDU

(intravenous drug users). The infection rate among IVDU was 2.22 % for HDV.¹⁵ Amarapurkar DN et al, assayed the seroprevalence among 148 patients with HBV related acute viral hepatitis in Mumbai, India. They reported seropositive in 16% (23/148) patients.¹⁶

In present study one HDV seropositive case is found in FHF group. Celen M K and his co-workers reported high prevalence rate of HDV among fulminant hepatitis (27.5%) in Turkey.¹⁷ Chakraborty P et al reported high prevalence in FHF group (20%) in Northern part of India.¹²

This low prevalence is identical with the results reported by other workers viz., 1.2% HDV infection in HBsAg Carriers, Ramia S, El- Zaatari M et al¹⁸, Lebanon; 4.2% HDV infection Huo et al¹¹. However, some other workers from India have also reported a high prevalence of delta hepatitis 10.7% Singh V et al¹⁴; 10.6% Chakraborty P et al.¹² The difference in reference to the prevalence of delta infection in viral hepatitis as compared to the other workers may be related to the various factors (like I.V. drug user, prostitute, medical facility to the community, health education) in individual cases, which make them more susceptible.

The present study does not show seropositive case in acute viral hepatitis (AVH) group. Ramirez AM and his co-workers reported that HDV infections lower in acute viral hepatitis compared to chronic HDV infection in New Zealand.¹⁹ They reported HDV prevalence of 3.8-4.8% in AVH and 28% in chronic hepatitis. Chakraborty P et al had also reported low prevalence (3.1%) among AVH in India.¹²

HDV infection was not found in hepatocellular carcinoma and cirrhosis patients in this study with a prevalence of 1.12%. But, Singh V et al reported 10.7% prevalence of HDV in Northern part of India. It is possible that the epidemiology of delta virus is undergoing a change over time with a trend towards decreasing prevalence.²⁰ In the present study, only one HDV seropositive was found in male population. Chen CJ et al reported that males had a higher prevalence than females in blood donors (2.7% versus 0), STD patients (8.2% versus 7.5%), and drug abusers (69.0% versus 57.1%) but the difference was not statistically significant.²¹

The factors responsible for such an epidemiological transition could be routine screening of blood and blood products for HBsAg, Extensive promotion of disposable needles and other medical instruments and sustained in epidemiology of delta agent in different parts of the world and even in different parts of India probably a host genetic susceptibility to this ubiquitous agent.

Some countries have witnessed a declining trend in the prevalence of HDV infection. According to L. Matthyssen et al prevalence of anti-HD antibody was 4.04% amongst 173 cases of HBsAg reactive patients.^{6,22}

A decreasing trend of HDV infection from 15.1% in 1983 to 7.1% in 1992 had also been reported from Spain, Navascues CA et al.⁹ From Taiwan, Huo et al had reported a decrease in HDV endemicity from 23.7% in 1983 to 4.2% in 1995.¹¹ The reduction in HDV in seroprevalence has been postulated to result from various sexually transmitted diseases, promotion of disposable needles and better control of HBV infection itself.

CONCLUSION

The present study was undertaken to see the prevalence of hepatitis D virus in Indian patients with HBV-related acute and chronic liver diseases by serology.

In conclusion, HDV infection does not appear to be commonly in North-Eastern part of Indian patients. The results also suggest that the HDV epidemiology in this part of world may possibly be undergoing a transition with a trend towards declining prevalence.

Conflict of interest: None declared.

Ethical clearance: Taken.

Source of funding: Self.

REFERENCES

1. Dienstag LG, Isselbacher KJ. Acute hepatitis. In: Wilson JD, Braunwald E, Hauser SL, Fauci AS, Longo DL, Jameson JL, Editors. Harrison's principles of Internal Medicine (Vol-2). 15th ed. New york: McGraw Hill Inc; 2001. p. 1721-36.
2. Taylor JM. Delta Hepatitis. In: Mahy BWJ, Collier L Editors. Topley and Wilson's Microbiology and Microbial infection(vol-2). 10th ed. New york: Oxford University press; 2005. p. 1269-1275.
3. Blumberg BS, Alter HJ and Visnich S. A new antigen in leukemia sera. JAMA 1965;191:541-546.
4. Blumberg BS and Gerstley BJ et al. A serum antigen (Australian antigen) in Down's syndrome, leukemia and hepatitis. Ann Intern Med. 1967;66:924-31.
5. Shakil AO, Hadziyannis S, Hoofnagle JH, et al. Geographic distribution and genetic variability of hepatitis delta virus genotype. Virology 1997;234:160-167.
6. Shah Latika J, Mulla Summaiya A. Prevalence Of Hepatitis D Virus (Hdv) In South Gujarat. J Microbiol Immunol infects 2008;41:227-230.
7. Gerin JL In: Nishioka K, Suzuki S, Oda T eds. The Toxonomy of hepatitis delta Virus. Viral hepatitis and liver disease. Spingerverlag: Tokyo, Japan;1994. p. 63-65.
8. Sagnelli E, Stroffolini T, Ascione A, Chiaramonte M, Craxi A, Giusti G, et al. Decrease in HDV endemicity in Italy. J Hepatol 1997;26: 20-24.
9. Navascues CA, Rodriguez M, Sotorrio NG, Sala P, Linares A, Suarez A, et al. Epidemiology of hepatitis D virus infection: changes in the last 14 years. Am J Gastroenterol 1995;90:1981-4.
10. Gaeta GB, Stroffolini T, Chiaramonte M, Ascione T, Stornaiuolo G, Lobello S, et al. Chronic hepatitis D: a vanishing disease? An Italian multicenter study. Hepatology 2000;32:824-7.
11. Huo TI, Wu JC, Lin RY, Sheng WY, Chang FY, Lee SD. Decreasing hepatitis D virus infection in Taiwan: an analysis of contributory factors. J Gastroenterol Hepatol 1997;12:747-51.
12. Chakraborty P, Kailash U, Jain A, Goyal R, Gupta RK, Das BC, Kar P. Seroprevalence of hepatitis D virus in patients with hepatitis B virus-related liver diseases. Indian J Med Res 2005;122:254-257.
13. Abbas Z, Jafri W, Raza S. Hepatitis D: Scenario in the Asia-Pacific region. World J Gastroenterol 2010;16(5):554-62.
14. P Jain, S Prakash, S Gupta, KP Singh, S Shrivastava, DD Singh et al. Prevalence of hepatitis A virus, hepatitis B virus, hepatitis C virus, hepatitis D virus and hepatitis E virus as causes of acute viral hepatitis in North India: A hospital based study. Indian Journal of Medical Microbiology 2013;31(3):261-265.
15. Li J, Wang J, Tian K, Wang Y, Zhang L, Huang H. Epidemiology of hepatitis B, C, D and G viruses and cytokine levels among intravenous drug users. J Huazhong Univ Sci Technolog Med Sci 2006;26:221-224.
16. Amarapurkar DN, Vishwanath N, Kumar A, Shankaran S, Murti P, Kalro RH, et al. Prevalence of delta virus infection in high risk population and hepatitis B virus related liver diseases. Indian J Gastroenterol 1992;11:11-2.
17. Celen MK, Ayaz C, Hosoglu S, Geyik MF, Ulug M. Anti-hepatitis delta virus seroprevalence and risk factors in patients with hepatitis B in Southeast Turkey. Saudi Med J 2006 May;27(5):617-20.
18. Ramia S, El-Zaatari M, Sharara AI, Ramlawi F, Farhat B. Current prevalence of hepatitis delta virus (HDV) infection and the range of HDV genotypes in Lebanon. Epidemiol Infect 2007;135:959-962.
19. Ramirez AM1, Lee SP, Woodfield DG. Hepatitis delta virus infection: a recently imported disease in New Zealand. N Z Med J 1987 Apr 22;100(822):235-7.
20. Singh V, Goenka MK, Bhasin DK, Kochhar R, Singh K. A study of hepatitis delta virus infection in patients with acute and chronic liver disease from northern India. J Viral Hepat 1995;2:151-4.
21. Chen CJ, Tseng SF, Lu CF, Lin HC, You SL, Chen CS, Hwang SJ, Hsieh SF, Hsu ST. Current seroepidemiology of hepatitis D virus infection among hepatitis B surface antigen carriers of general and high-risk populations in Taiwan. J Med Virol 1992;38:97-101.
22. Matthyssen L et al. Organon Scientific Development Group, Netherlands, Viral Hepatitis and Liver Disease. 1988. p. 409-411.

ORIGINAL PAPER

A Clinical Study of Arthroscopic Management of Meniscal Injuries of Knee Joint

Paul Gautam Chandra¹, Biswas Samrat², Das SK³, Sipani AK⁴

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ABSTRACT

Background: This prospective clinical study attempts to evaluate the role of arthroscopic surgery in meniscal injury of knee joint. Low morbidity and early rehabilitation associated with arthroscopic surgery of meniscal injuries makes it a highly acceptable procedure.

Materials and Methods: This study includes 30 cases of meniscal injuries of knee treated by arthroscopic techniques at Silchar Medical College and Hospital, Silchar between January 2011 to December 2012. Minimum follow up has been done upto 6 months.

Results: The mean age of the patients was 26.36 years. Twenty eight (93%) patients were male and 2 (7%) patients were female. Most sustained meniscal injury following sports related injuries (60%). Arthroscopic partial meniscectomy was done in 28 patients and arthroscopic meniscal repairs done in 2 patients. Mean operative time for meniscectomy was 75 minutes. Functional outcome was assessed based on Lysholm Knee Score and Tapper and Hoover Grading System in follow up period. Excellent to good results were found in 80% cases.

Conclusion: Arthroscopic partial meniscectomy and repair are minimal invasive technique, advantage of which includes early return to work, minimal complications, early post operative rehabilitation, short duration of hospital stay. Hence these are the preferred technique for treatment of meniscal injuries. Though arthroscopic partial meniscectomy is a preferred method of treatment but in repairable meniscal injuries meniscus preserving surgery should be tried.

Keywords: Meniscal tear, arthroscopic partial meniscectomy, arthroscopic meniscal repair

INTRODUCTION

Menisci are essential for the normal function of the knee joint. The menisci act as a joint filler, compensating for gross incongruity between femoral and tibial articular surfaces. The menisci prevent capsular and synovial impingement during flexion-extension movements. It is believed to have joint lubrication properties.¹

The menisci have been shown to play a vital role in load transmission across the knee joint.² The menisci have shock or energy-absorbing functions.³ Meniscus injuries are produced most commonly by rotation as the flexed knee moves toward an extended position.⁴ Meniscal injuries of the knee joint are common in sportsperson and athletes.⁵ In other individuals, meniscal injuries can also occur as a result of road traffic accident and mine workers involving rotational injuries of knee joint. Meniscal tears are the most common injury of the knee, with an incidence of meniscal injury resulting in meniscectomy of 61 per 100 000 population per year.⁶ Typical signs and symptoms are clicking, catching or snapping. A knee effusion may or may not be present, but most patients will have joint line tenderness.

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Arthroscopic procedure of knee joint also improves accuracy of the diagnosis of meniscal injuries, reduces hospital stay, minimizes complications and improves the quality of life. Simpson DA et al.⁷ reviewed comparative analysis of open and close meniscectomy results and confirmed the overall economical and therapeutic advantage of arthroscopic partial meniscectomy over open meniscectomy.

AIMS AND OBJECTIVES

The present study is designed to evaluate the effectiveness of arthroscopy to confirm the types of meniscal injuries in clinically suspected cases and to assess the outcome of arthroscopic partial meniscectomy and meniscal repair in a tertiary centre like ours.

MATERIALS AND METHODS

This study includes 30 cases of meniscal injuries of knee treated by arthroscopic techniques at Silchar Medical College and Hospital, Silchar between January 2011 to December 2012. Minimum follow up has been done up to 6 months.

Patients aged between 18-50 years with clinically suspected meniscal injuries and suggestive MRI findings of meniscal lesion are included in the study. Patients with infective condition in and around the knee joint, meniscal injuries with tibial plateau fractures and/or distal femoral fracture and patients with medical contraindications are excluded from the study.

Patients with both clinically suspected and MRI diagnosed meniscal injury were admitted. Then patients were thoroughly examined clinically and routine investigation were done and documented.

All patients were operated under spinal anaesthesia and tourniquet was used. Arthroscopic partial meniscectomy was done in 28 patients and arthroscopic meniscal repair was done in 2 patients. Most common combination used was anterolateral portal for arthroscope and anteromedial portal for the instrumentation. Arthroscopic meniscal repair was done by Outside-in technique.⁸ In this technique two 18 gauge spinal needles were passed from outside the joint to inside the joint under arthroscopic vision. After reduction of meniscal fragments, they were tied with non-absorbable suture materials through the spinal needles.

Postoperatively Jones type padded bandage was applied and physiotherapy was started from day 1. Patients were allowed to bear full weight on second postoperative day onwards in arthroscopic partial meniscectomy group.

Weight bearing was avoided for at least 6 weeks in meniscal repair group. Out of 30 patients, 9 were associated with partial/complete ACL tear, 4 associated with articular cartilage degeneration and 2 associated with loose body.

RESULTS

28 (93%) patients were male and 2 (7%) patients were female. Age ranges from 18-46 years with a mean age of 26-36 years. Meniscal injuries in left knee were found in 17 (57%) cases and right knee in 13 (43%) cases. Mode of injuries was sports related injuries in 18 (60%) cases, road traffic accident 7 (23%) cases and history of fall in 5 (17%) cases. Twenty (67%) cases were medial meniscus tear and 10 (33%) cases were lateral tear. The most type of tear was Longitudinal tear (Bucket handle) (53%). Arthroscopic partial meniscectomy was done in 28 patients and arthroscopic meniscal repair was done in 2 patients. There were 9 cases of partial/complete ACL tears of which 7 cases were reconstructed with SMT graft. Two cases associated with loose bodies which were removed arthroscopically. Four cases associated with articular cartilage degeneration of which in one case arthroscopic microfracture performed. Complication such as haemarthrosis observed in two cases. Duration of hospital stay was average 2-7 days with a range of 2-4 days. Mean time for return to work was 14-8 days with range from 10-22 days. Patients were followed up in the out patient department on 2nd week and 4th week, after that every month for 6 months. Functional outcome was assessed based on Lysholm.

Knee Score and Tapper and Hoover Grading System⁹ in follow up period. Excellent to good results was found in 80% cases.

Case 1: Intraoperative Findings and Arthroscopic Techniques Of Meniscus Repair

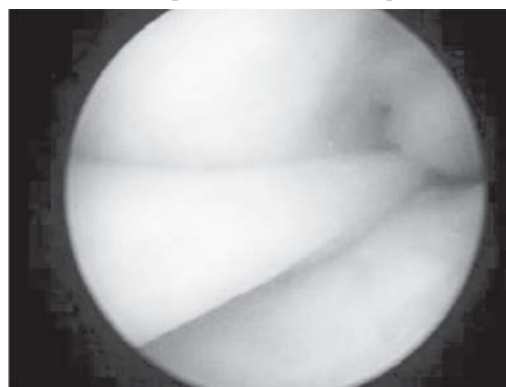


Figure 1 Bucket handle (BH) tear

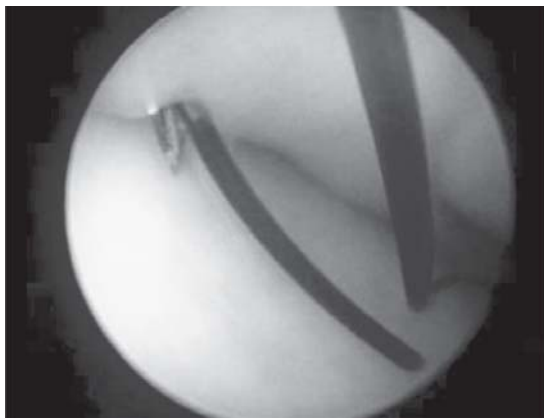


Figure 2 Suture insertion



Figure 5 Biting with Basket Forcep



Figure 3 After Repair

Case 2: Intraoperative Findings & Arthroscopic Techniques Of Partial Meniscectomy



Figure 4 BHMM Tear



Figure 6 Resected Meniscal Fragment

DISCUSSION

Treatment of meniscal injuries has evolved from conservative management, open meniscectomy and meniscal repair to closed arthroscopic partial meniscectomy and meniscal repair. Simpson DA et al⁷ reviewed the overall economical and therapeutic advantage of arthroscopic partial meniscectomy over open meniscectomy. Other authors have reported short hospital stay and early return to work and sports like Northmore-Ball et al¹⁰; Lysholm, Gillquist et al¹¹; GoodFellow JW et al¹²; Dandy DJ et al.¹³ Biedert RM et al¹⁴ reviewed short-term results were best by performing partial meniscectomy. However, other studies of meniscus preserving surgeries have reported even better medium to long term results like Paxton ES, Stock MV et al¹⁵; Dave LY, Caborn DN et al.¹⁶

In our study 28 (93%) patients were males, with mean age of all 30 patients was 26.36 yrs and 57% involvement was left side. In series of Simpson DA et al⁷ the mean age of

the 230 patients was 30.7 years. Men and boys formed 90% of the series.

In our series 60% of cases were sports related injuries, 23% road traffic accidents and 17% history of fall. In Rao PS, Rao SK et al⁵ reviewed sports related injuries was the most common mechanisms of injury.

Out of 30 cases incidence of medial meniscus tear was 67% and lateral meniscus tear was 33% and longitudinal (bucket handle) tear was the most common type of meniscal tear. In series of Dandy DJ et al¹⁷ medial meniscus tear was 70.5% and lateral meniscus tear was 29.5% and vertical (longitudinal) tear was common than the other type of meniscal tear.

Mean operative time in our series was 75 minutes as compared to 45 minute by Tregonning RJ et al.¹⁸ Mean duration of hospital stay in our study was 2.7 days (range 2-4 days) compared to 2.4 days (range 1 to 7 days) as reported by Simpson DA et al.⁷

Functional outcome results in our series excellent 57%, good 23%, fair 20% and poor 0% as compared to results in series of Rao PS, Rao SK et al⁵ was excellent and good 81.25% and fair and poor 18.75%. Functional results in series of Simpson DA et al⁶ was excellent to good in 80.55% of cases.

Majority of our patients returned to their premeniscal injury activity in 14.8 days where as in series of Tregonning RJ et al¹⁸ mean time for return to work was 12.9 days and in series of Dandy DJ et al¹³ was 10.5 days.

In our study we found correlation between clinical and radiological features with the arthroscopic findings. Thus arthroscopic partial meniscectomy and meniscal repair have many advantages in the treatment of meniscal injuries. Arthroscopic surgery reduces hospital stay, gives early relief of symptoms, low morbidity and patients return to their work early and minimal complications. Though our study was a short term outcome study but it confirmed the advantage of arthroscopic surgery in meniscal injuries. However, long term study is required for conclusive remark.

CONCLUSION

Incidence of meniscal injuries is most common in third decade in male persons due to sports related injuries and second commonest cause is road traffic accident. Arthroscopic partial meniscectomy and repair are minimally invasive technique. Advantage of which includes early return to work, minimal complications, early post operative

rehabilitation, short duration of hospital stay. Hence these are the preferred technique for treatment of meniscal injuries. Results were better in age group less than 40 years and in patients with early presentation. Though arthroscopic partial meniscectomy is a preferred method of treatment but in repairable meniscal injuries meniscus preserving surgery should be tried. But it is a technically difficult procedure with steep learning curve. From our present study we conclude that arthroscopic surgery may be a preferred treatment option for management of meniscal injuries.

Contribution of Authors

We declare that author(s) named in this article did this work and all liabilities pertaining to claim relating to the content of this article will be borne by the authors. The study was conceived and designed by Dr. Gautam Chandra Paul, who also collected and analyzed the data. Dr. Samrat Biswas, Dr. SK Das and Dr. AK Sipani contributed to analyze the data and designing the manuscript.

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REFERENCES

1. Textbook "Campbell's Operative Orthopaedics", eleventh edition, chapter 43, Knee Injuries by Robert H. Miller III and Frederick M. Azar, p. 2417-2436.
2. Seedholm Bb, Dowson D, Wright V. Functions of the menisci: a preliminary study. J Bone Joint Surg [Br] 1974;56-B:381-2.
3. Voloshin As, Wosk J. Shock absorption of meniscectomized and painful knees: a comparative in vivo study. J Biomed Eng 1983;5:157-61.
4. Renstrom P, Johnson RJ. Anatomy and biomechanics of the menisci. Clin Sports Med 1990;9:523-38.
5. Rao PS, Rao SK, Bhat SN. Short and long term results of arthroscopic partial meniscectomy. Indian Journal of orthopedics 2004;38(3):158-161.
6. Baker PE, Peckham AC, Pupparo F, Sanborn JC. Review of meniscal injury and associated sports. Am J Sports Med 1985;13:1-4.
7. Simpson DA, Thomas NP, Aichroth PM. Open and closed meniscectomy. A comparative analysis. J Bone and Joint Surgery Br 1986 Mar;68(2):301-304.
8. Textbook "Manual Of Arthroscopic Surgery", Chapter 2: Knee Joint – Special Part, by Michael J. Strobel, p. 97-199.

9. Rao SK, Rao PS. Lysholm Scoring system to evaluate Meniscal injury. Indian Journal of Orthopaedics 1997;31(2):107-109.
10. Northmore- Ball, Dandy DJ, Jackson RW. Arthroscopic, open partial, and total meniscectomy-A comparative study. J Bone and Joint Surgery 1983 Aug;65(4):400-404.
11. Lysholm J, Gillquist J. Endoscopic meniscectomy J Int Orthop 1981;5(4):265-270.
12. Goodfellow JW. Closed meniscectomy. J Bone Joint Surg (Br) 1983 Aug;65(4):373-374.
13. Dandy DJ. Early results of closed partial meniscectomy. J Br Med 1978 Apr 29;1(6120):1099-1100.
14. Biedert RM. Treatment of intrasubstance meniscal lesions: a randomized prospective study of four different methods. J Knee Surg Sports Traumatol Arthrosc 2000;8(2):104-108.
15. Paxton ES, Stock MV, Brophy RH. Meniscal repair versus partial meniscectomy: a systematic review comparing reoperation rates and clinical outcomes. J Arthroscopy 2011 Sep;27(9):1275-88.
16. Dave LY, Caborn DN. Outside-in meniscus repair: the last 25 years. J Sports Med Arthrosc 2012 Jun;20(2):77-85.
17. Dandy DJ. The arthroscopic anatomy of symptomatic Meniscal lesions. J Bone and Joint Surgery 1990 July;72(4):628-633.
18. Tregonning RJ. Closed partial meniscectomy early results for simple tears with mechanical symptoms. J Bone and Joint Surgery 1983 Aug;65(4):378-382.

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ORIGINAL PAPER

High Frequency Ultrasound and Color Doppler Evaluation of Carotid Artery Atherosclerosis in Hypertensive Patients Compared with Normotensives

Dutta Parul¹, Paul Sudip²

Received on September 01, 2015; editorial approval on November 01, 2015

ABSTRACT

Objective: To evaluate the relationship between hypertension and carotid atherosclerosis by high-frequency ultrasound and color Doppler with a comparison to normotensive.

Method: Using high frequency ultrasound technology and color Doppler to detect 60 cases of patients with hypertension and 40 cases with normal blood pressure of carotid artery intima-media thickness, atherosclerotic plaque size, echo intensity. Compared the difference of above indicators of hypertensive patients and normal blood pressure and blood pressure.

Result: Intima media thickness of hypertensive patients (0.95 ± 0.09), Resistive Index of hypertensive patients (0.77 ± 0.03) was significantly higher than normal blood pressure group ($P 0.01$). The higher of blood pressure levels (systolic blood pressure), the greater carotid intima-media thickness.

Conclusion: The hypertensive patients with carotid atherosclerosis are significantly higher than patients with normal blood pressure, and the higher blood pressure levels.

Keywords: High frequency ultrasound, color doppler, carotid artery, atherosclerosis

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INTRODUCTION

Depending on methods of patient ascertainment, 80–95% of hypertensive patients are diagnosed as having “essential” hypertension. In the remaining 5–20% of hypertensive patients, a specific underlying disorder causing the elevation of blood pressure can be identified.¹ In India, hypertension is the leading non-communicable disease risk and estimated to be attributable for nearly 10 per cent of all deaths.²

Elevated blood pressure is an independent cause of serious cardiovascular diseases and premature mortality from such diseases.³ Hypertension plays an important and critical role in atherosclerotic cardiovascular disease, but its impact is greatly influenced by coexistent contributors, particularly abnormalities in blood lipid and glucose metabolism. Atherosclerotic cardiovascular sequelae including stroke, coronary disease and peripheral arterial disease, all occur with two- three fold frequencies in hypertensive compared to normotensives of the same age.⁴ Increase in **Intima-media thickness [IMT]** of an artery has been used as a surrogate marker of the early atherosclerotic process.⁷

The development of noninvasive techniques such as high-resolution ultrasound imaging allows the measurement of combined IMT.⁸ The areas open to investigate with high-resolution ultrasound technique are mainly carotid and femoral arteries. Many studies have shown that the atherosclerotic process start to develop in the carotids approximately at the same time as in aorta, actually preceding plaque occurrence in coronary arteries.

Thickening of Intima media complex not only reflects the local morphological alterations in the carotid arteries but also corresponds to generalized atherosclerosis as suggested by several studies showing significant correlation between carotid artery atherosclerosis and coronary artery atherosclerosis.⁹

Carotid artery distensibility, which diminishes with increasing severity of atherosclerosis, also shows similar correlation with generalized atherosclerotic changes. However, assessment of an arterial distensibility requires relatively arduous procedure and is subject to inter observer and intra observer variability. In contrast, the **Resistive index [RI]** according to Pourcelot is a hemodynamic parameter that is easily determined by Doppler sonography basically reflecting the vascular resistance, which in turn depends on distensibility of the vessel. Thus, during assessing the atherosclerosis of vascular system, IMT and RI play complementary role to each other.¹⁰

The present cross sectional study was undertaken to assess the Carotid IMT changes and associated changes in RI in hypertensive patients using high frequency ultrasound and color Doppler and to compare the findings in hypertensive subjects with normotensive subjects.

MATERIAL AND METHOD

This study was carried out in the department of Radio-diagnosis of Gauhati Medical College, Guwahati with clinically diagnosed hypertension from mid September 2014 to mid September 2015.

A structured proforma was used to enter the clinical history, physical examination findings, investigations - hematological, urinary and duplex sonography findings. Ultrasonography was performed on Siemens Acuson Antares Color Doppler Ultrasound System with VFX13-5 linear transducer of frequency 5-13 MHz.

RESULT

Out of 100 cases we selected 60 hypertensive patients aged between 35-55 years and 40 normotensive subjects of same age group.

Compared to normotensive, hypertensive showed significantly higher systolic BP, diastolic BP, Mean arterial pressure, total cholesterol, LDL cholesterol and triglycerides (**Table 1**). Whereas BMI, glucose levels, age and sex distribution and HDL cholesterol were similar in both groups.

Table 1 Demographic data of two groups

Demographic characteristics	Normotensive	Hypertensive	p value
Age	49.02± 5.71	50.02±5.35	0.379
Sex	Female-45% Female-43.33%	Male-55% Male-56.67%	>0.05
SBP	111.95±6.38	151.43±4.46	<0.01
DBP	75.65±4.94	97.47±3.33	<0.01
MAP	87.75±5.06	115.45±3.33	<0.01
HR	79.35±4.95	79.36±4.65	0.99
BMI	23.6±1.10	23.86±1.31	0.30
TC	146.5±7.77	169.1±5.49	<0.01
TG	115.6±11.74	169.18±7.28	<0.01
LDL	66.9±3.68	71.52±4.07	<0.01
HDL	51.05±3.38	49.55±4.02	0.055
Glucose	94.38±6.25	94.2±5.95	0.89

SBP-Systolic blood pressure; DBP-Diastolic blood pressure; MAP-Mean arterial pressure; HR-Heart rate; BMI-Body mass index; TC-Plasma total cholesterol; and TG-Plasma triglycerides. Mean±SD is reported.

Age distributions of the subjects are shown in **Figure 1**. Both hypertensive and normotensive groups were proportionately distributed in all age groups

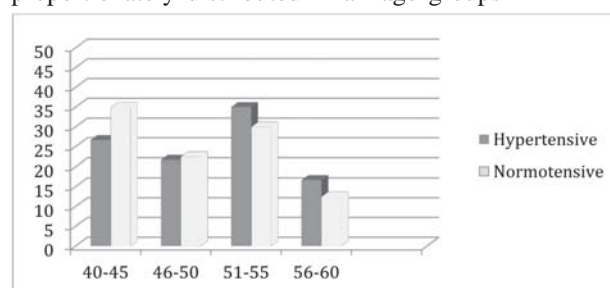


Figure 1 Age distribution of Normotensives and Hypertensive (n=100)

Sex distribution of hypertensive and normotensive groups are shown in **Figure 2**.

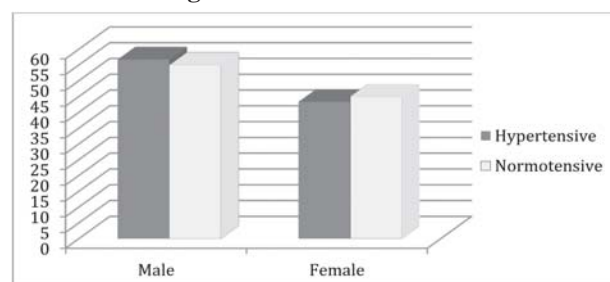


Figure 2 Sex distributions of Normotensives and Hypertensive (n=100)

Table 2 Blood Pressure parameters in Normotensives and Hypertensive

Blood pressure	Normotensive (Mean± SD)	Hypertensive (Mean ± SD)	ANOVA p value
Systolic	111.95±6.38	151.43±4.47	<0.01
Diastolic	75.65±4.94	97.47±3.33	<0.01
MAP	87.75±5.06	115.46±3.33	<0.01

Different blood pressure parameter status in hypertensive and normotensive groups is shown in **Table 2**. Compared to normotensives, hypertensive showed significantly higher systolic BP, diastolic BP and Mean arterial pressure [MAP].

Table 3 shows the **Mean Intima media thickness [M-IMT]** measurement of right side, left side and combined values of both sides in hypertensive and in normotensives. There is highly significant increase in IMT on both sides in hypertensive compared to normotensives.

Table 3Effect of Hypertension on Intima media thickness

M-IMT	Normotensive	Hypertensive	ANOVA p value
LEFT	0.6±0.09	0.94±0.10	< 0.01
RIGHT	0.62±0.09	0.95±0.09	< 0.01
COMBINED (Average)	0.61±0.08	0.95±0.09	< 0.01

M-IMT - Mean Intima media thickness

Table 4 shows **Mean Resistive index [M-RI]** of right side, left side and combined value of both sides in normotensives and hypertensive. There is highly significant increase in Resistive index [RI] on both sides in hypertensive compared to normotensives.

Table 4 Effect of Hypertension on RI

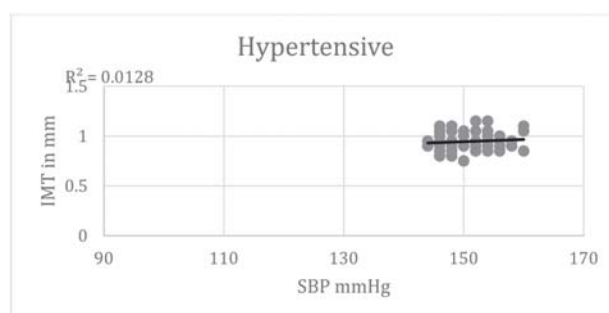
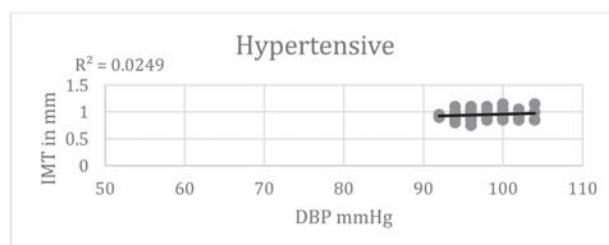
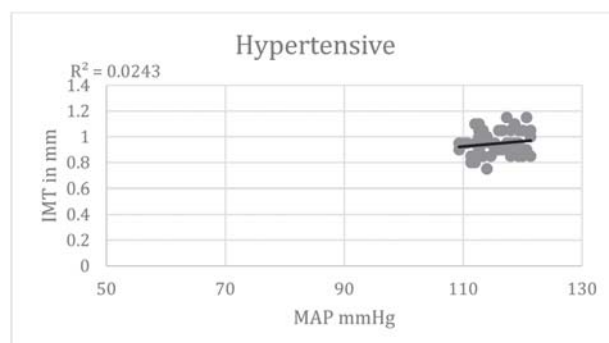
M-RI	Normotensive	Hypertensive	ANOVA p value
LEFT	0.65±0.03	0.77±0.03	P< 0.01
RIGHT	0.65±0.03	0.77±0.04	P<0.01
COMBINED (AVERAGE)	0.65±0.03	0.77±0.03	P<0.01

M-RI- Mean Resistive index

Table 5 and **Figure 3** shows relationship between various blood pressure parameters and IMT and RI in normotensive and hypertensive group.

Table 5 Relationship between blood pressure parameters and IMT and RI in both groups

Blood pressure status	Normotensive (Pearson correlation)		Hypertensive (Pearson correlation)	
	IMT	RI	IMT	RI
Systolic	-0.22 (0.174)	0.236 (0.143)	0.113 (0.389)	-0.076 (0.566)
Diastolic	-0.209 (0.195)	0.001 (0.993)	0.158 (0.228)	0.023 (0.864)
MAP	-0.228 (0.156)	0.1 (0.538)	0.156 (0.234)	-0.019 (0.887)

**Figure 3a** Relationship between Systolic blood pressure and IMT in Hypertensive group**Figure 3b** Relationship between Diastolic blood pressure and IMT in hypertensive group**Figure 3c** Relationship between Mean arterial pressure and IMT in hypertensive group

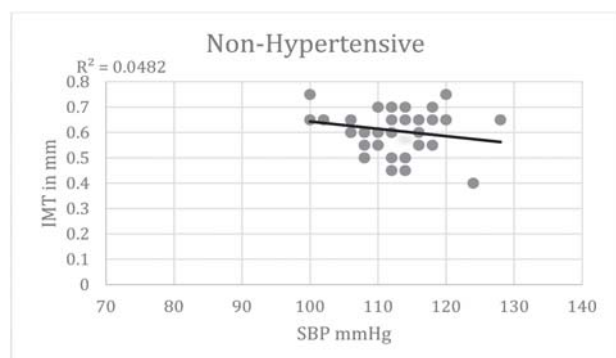


Figure 3d Relationship between Systolic blood pressure and IMT innormotensive group

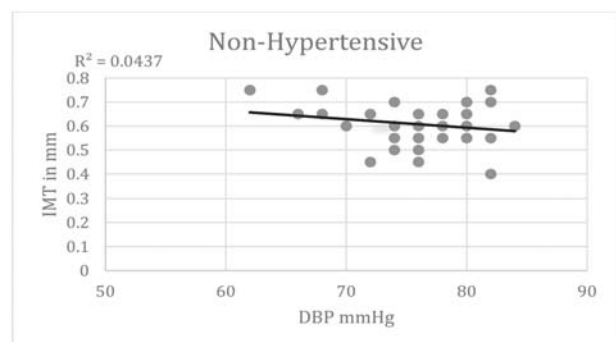


Figure 3e Relationship between Diastolic blood pressure and IMT innormotensive group

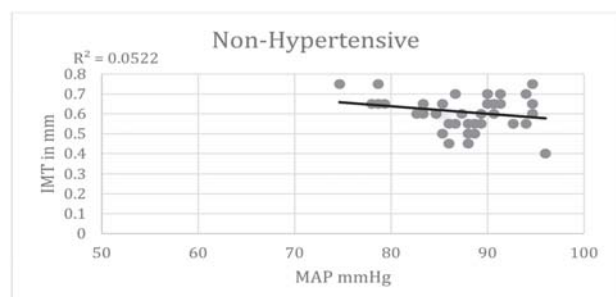


Figure 3f Relationship between Mean arterial pressure and IMT innormotensive group

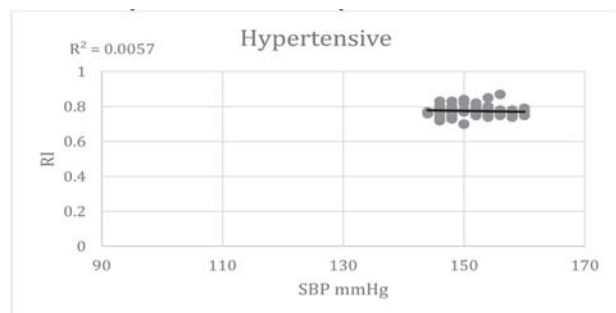


Figure 3g Relationship between systolic blood pressure and RI in hypertensive group

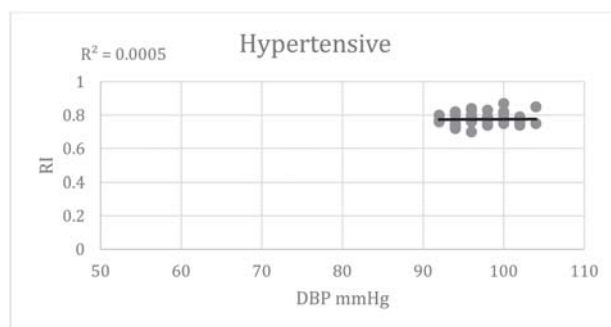


Figure 3h Relationship between diastolic blood pressure and RI inhypertensive group

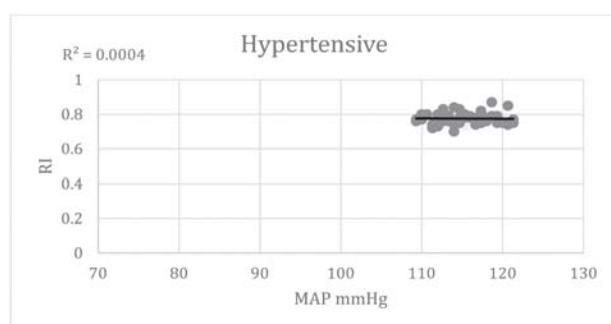


Figure 3i Relationship between Mean arterial pressure and RI inhypertensive group

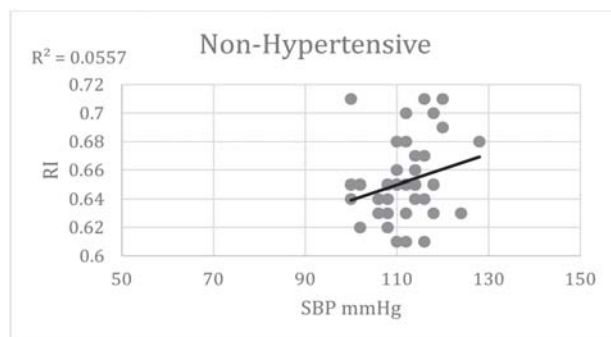


Figure 3j Relationship between systolic blood pressure and RI in normotensive group

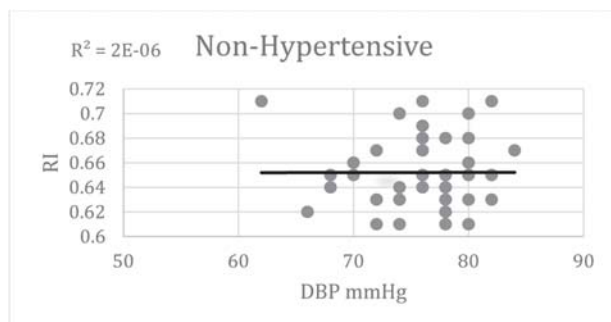


Figure 3k Relationship between diastolic blood pressure and RI in normotensive group

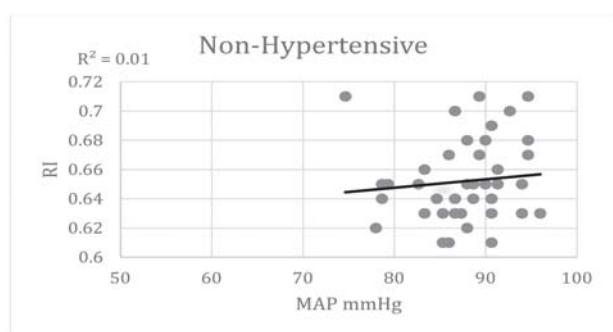


Figure 31 Relationship between mean arterial pressure and RI in Normotensive group

DISCUSSION

The mean systolic blood pressure, mean diastolic blood pressure, mean arterial pressure, mean total cholesterol, mean LDL cholesterol, mean HDL cholesterol and mean triglyceride levels in this study was 151.43 ± 4.46 mm Hg, 97.47 ± 3.33 mm Hg, 115.45 ± 3.33 mm Hg, 169.1 ± 5.49 mg/dl, 71.52 ± 4.07 mg/dl, 49.55 ± 4.02 mg/dl and 169.18 ± 7.28 mg/dl respectively in the hypertensive group whereas in the normotensive group the values were 111.95 ± 6.38 mm Hg, 75.65 ± 4.94 mm Hg, 87.75 ± 5.06 mm Hg, 146.5 ± 7.77 mg/dl, 66.9 ± 3.68 mg/dl, 51.05 ± 3.38 mg/dl and 115.6 ± 11.74 mg/dl respectively. On statistical analysis it was found that mean systolic blood pressure, mean diastolic blood pressure and mean arterial pressure, mean total cholesterol, mean LDL cholesterol and mean triglyceride level were significantly high in hypertensive patients compared to the normotensive group.

We examined bilateral common carotid arteries of all patients with duplex sonography and IMT and RI were assessed. By measuring IMT and RI we assessed both morphological and hemodynamic [physiological] changes. When RI and IMT measurements are compared, the essential advantages of the former are the easier data acquisition by the use of simple duplex apparatuses, the tendency to have less interobserver and intraobserver variability, and the smaller side difference.¹⁰ We assessed IMT from the distal common carotid artery proximal to carotid bulb. Although, some authors have found an even better correlation with the degree of atherosclerosis when using IMT values for combination of ICA and CCA values, we have restricted ourselves to the determination of IMT in the CCA. Because IMT measurements in the ICA have a massive scatter and IMT measurement of CCA is easier to obtain, more reliable, and have been proved by many studies. RI was also assessed at the same site. We found the mean IMT and

RI to be 0.95 ± 0.09 mm & 0.77 ± 0.03 respectively in the hypertensive group whereas in the normotensive group the corresponding values were 0.61 ± 0.08 mm and 0.65 ± 0.03 . The results obtained were analyzed statistically. The results of our study indicate highly significant relationship between hypertension and increase in IMT and RI [$P < 0.01$] of CCA in hypertensive. The normotensive group however did not show any such increase in IMT and RI.

Pearson correlation test was used to show the relationship between blood pressures parameters [SBP, DBP and MAP] with IMT and RI values of CCA. However no significant relationship was found between the degree of hypertension and IMT and RI values of CCA.

The results of our study closely correlates with the results of the previous Indian study done by M Adaikkappan et al. in 2002.¹¹ They studied IMT of two hundred and sixty hypertensive patients over a period of three years and compared with seventy normotensive patients. They also studied the associated Doppler parameter changes along with IMT. They concluded that IMT is significantly elevated in hypertensive compared with normotensives. The mean value of IMT in hypertensive in their study was around 1.01 mm and 1.09 mm for the Right and Left sides respectively with P value of < 0.01 . In our study the mean IMT measurement in hypertensive was 0.95 and 0.94 with P value of < 0.01 , which is indicative of highly significant relationship. Their study also showed increase in resistive index in hypertensive patients compared to normotensives. Our study also showed similar increase in mean RI in hypertensive with mean value of 0.77 with the P value of < 0.01 [highly significant] compared to normotensives. However in our study the resistive index of both hypertensive and normotensive groups were comparatively higher being 0.77 and 0.65 respectively. Our study showed significantly higher LDL cholesterol, total cholesterol and triglycerides levels in hypertensive, which was also seen in their study.

Our study also correlates with the study conducted by Srinivas Prasad R. H. in 2005.¹² They also found highly significant increase in intima media thickness and resistive index in hypertensive patients compared to the non hypertensive people with similar elevation of LDL cholesterol and triglycerides in the hypertensive group.

The role of hypertension in the development of LDL cholesterol and triglycerides mediated atherosclerosis measured by Common carotid artery IMT was confirmed by the study of Sun et al in 2000.¹² They observed that elevated LDL cholesterol and triglycerides were associated

with increased IMT in higher blood pressure after adjustment for the other risk factors. This supports the response-to-injury model of hypertension-induced atherosclerosis. Another explanation for the IMT thickening along with increased LDL cholesterol and triglyceride levels occurring in hypertensive was suggested to be adaptive thickening of the intima and the media.¹³ Such thickening is characterized by remodeling to counteract the rise in wall tension observed as medial hypertrophy in the presence of hypertension. In contrast, maladaptive thickening involving monocyte recruitment and lipid accumulation in the intima occurs in the high BP tertile group, in which endothelial damage is more likely to be sufficient to initiate atherogenesis. These findings were supported in the ACAPS study, where the effect of the lipid-lowering lovastatin intervention was larger in hypertensive patients than in the nonhypertensive group.^{12, 13} P Sharma, et al., in their study also supported this study. The age of the study population ranged from 35 to 65 years. Mean IMT was significantly high in hypertensive patients compared to the control group, $p < 0.001$.¹⁴

Massimo Puato et al. also found that in grade I hypertensive subjects, both mean IMT and mean of maximum IMT were significantly higher compared with baseline values. Compared with normotensive subjects, both mean IMT and maximum IMT increased significantly (at least $P < 0.01$) in each carotid artery segment. The increase in cumulative IMT was 3.4 fold for mean IMT and 3.2 fold for mean of maximum IMT.¹⁵

The Plavnik et al. also showed intima media complex (IMC) of common carotid artery and femoral artery to be thicker in hypertensive patients than in normotensive subjects.¹⁶ Similar results were obtained earlier by Jiang et al.¹⁷ and Labrova et al.¹⁸ in their studies. Mechanisms by which hypertension predisposes to atherosclerosis may include endothelial dysfunction, hyperinsulinemia, hemodynamic stress, and multiple metabolic alterations. Impaired production of endothelium-derived relaxing factors and increased activity of endothelium-derived contractile substances have been demonstrated in hypertensive patients, preceding overt atherosclerotic disease.¹⁹

Vicenzini E et al. assessed CCA IMT, the CCA RI, and the presence of carotid plaques in 1655 consecutive patients and found that risk factors for atherosclerosis including hypertension were independently associated with higher IMT values and an increase in the RI, which is similar to

our findings. They further found that synergic action of risk factors might cause further deterioration of mechanical forces independent of carotid atherosclerosis.²⁰ Anna Skalska et al. on multiple regression analysis study they found that IMT-CCA was significantly influenced by the age and SBP while RI was influenced by SBP and DBP.²¹

CONCLUSION

High-resolution sonography using high frequency transducers gives superb resolution of vessel wall layers so that all layers of the vessel wall namely, intima, media and adventitia can be clearly visualized. Increase in thickness of Intima media complex can be clearly visualized with high-resolution sonography and IMT can be accurately measured. Alteration in the vessel wall also causes alteration in hemodynamics of vascular system. Color Doppler gives accurate hemodynamic information within the blood vessels. RI is the widely studied hemodynamic parameter that shows alteration in its value along with IMT as the atherosclerosis progresses.

IMT thus gives morphological information and RI gives hemodynamic information in atherosclerosis of the blood vessels. Moreover when both parameters are studied together they are less prone for interobserver and intraobserver variability and will be more accurate. These parameters can be better studied in superficial arteries like carotid or femoral artery.

Conflict of interest: None declared.

Ethical clearance: Taken

REFERENCES

1. Longo, Fauci et al. Hypertensive Vascular Disease. Harrison's principles of internal medicine. 18th ed., The McGraw-Hill Companies, Inc., 2012, Chapter-247.
2. Patel V, Chatterji S, Chisholm D, Ebrahim S, et al. diseases and injuries in India, Lancet 2011;377:413-28.
5. Kannel WB. Blood pressure as a cardiovascular risk factor: prevention and treatment. JAMA 1996;275:1571-1576.
6. Palmer AJ, Bulpitt CJ, Fletcher AE, Beevers G, Coles EC, Ledingham JG, et al. Relation between blood pressure and stroke mortality. Stroke 1992;20:601-605.
7. Poli A, Tremoli E, Colombo A. Ultrasonographic measurement of the common carotid artery wall thickness in hypercholesterolemic patients: a new model for the quantification and follow up of preclinical atherosclerosis in living human subjects. Atherosclerosis 1988;70:253-261.
8. Pignoli P, Tremoli E, Poli A, Oreste P, Paoletti R. Intimal plus medial thickness of the arterial wall: a direct measurement with ultrasound imaging. Circulation 1986;74:1399-1406.

9. Gnasso A, Irace C, Mattioli PL, Pujia A. Carotid intima-media thickness and coronary heart disease risk factors. *Atherosclerosis* 1996;119:7–15.
 10. Beat Frauchiger, Hans Peter Schmid, Christian Roedel, Peter Moosmann, Daniel Staub. Comparison of carotid arterial resistive indices with Intima-Media thickness as sonographic markers of Atherosclerosis. *Stroke* 2001;32:836-838.
 11. M Adaikkappan, R Sampath, AJW Felix, S Sethupathy. Evaluation of Carotid Atherosclerosis by B'Mode Ultrasonographic Study in Hypertensive Patients Compared with Normotensive Patients. *Ind J RadiolImag* 2002;12:3:365-368.
 12. Sun P, Dwyer KM, Merz CNB, Sun W, Johnson CA, Shircore AM et al. Blood pressure, LDL cholesterol, and intima-media thickness. A test of the "response to injury" hypothesis of atherosclerosis. *Arterioscler Thromb VascBiol* 2000;20:2005-2010.
 13. Chohanian AV. Corcoran lecture: adaptive and maladaptive responses of the arterial wall to hypertension. *Hypertension* 1990;15:666-674.
 14. P Sharma, B Lohani et. al. Ultrasonographic evaluation of carotid intima-media thickness in hypertensive and normotensive individuals. *Nepal Med Coll J* 2009;11(2):133-135.
 15. Massimo Puato, Paolo Palatini et al. Increase in Carotid Intima-Media Thickness in Grade I Hypertensive Subjects. *Am Heart Assoc*, 2008;51:1300-1305.
 16. FL. Plavnik, SAjzen, et al. Intima-media thickness evaluation by B-mode ultrasound. Correlation with blood pressure levels and cardiac structures. *Brazilian Journal of Medical and Biological Research* 2000;33: 55-64.
 17. Jiang YN, Kohara K, Hiwada K. Alteration of carotid circulation in essential hypertensive patients with left ventricular hypertrophy. *J Hum Hypertens* 1998;12:173-9.
 18. Labrova R, Honzikova N, Madirova E *et al.* Age-dependent relationship between the carotid intima-media thickness, baroreflex sensitivity, and the inter-beat interval in normotensive and hypertensive subjects. *PhysiolRes* 2005;54:593-600.
 19. Touboul PJ, Elbaz A, Koller C *et al.* Common carotid artery intima-media thickness and brain infarction: the Etude du Profil Génétique de l'Infarctus Cérébral (GENIC) case control study. The GENIC Investigators. *Circulation* 2000;102:313-8.
 20. Edoardo Vicenzini, Maria Chiara Ricciardi et al. Common Carotid Artery Intima-Media Thickness Determinants in a Population Study. *J Ultrasound Med* 2007;26:427–432.
 21. Anna Skalska, Ewa Klimek et al. Factors influencing hemodynamic and morphological indicators of carotid arteries atherosclerosis in treated hypertensive patients *Artery Research*, March 2011, Volume 5, Issue 1, Pages 1–7.
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ORIGINAL PAPER

A Study of Socio-Demographic Profile of Persons Accused Under POCSO Act 2012

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ABSTRACT

To deal with child sexual abuse cases, the Government has brought in a special law, namely, "The Protection of Children from Sexual Offences (POCSO) Act" 2012. In this scenario it was thought imperative that a study be conducted to study the socio demographic profile of the persons accused of assault under this act. The age was normally distributed in the population was seen using Q-Q plot and Shapiro Wilk test. The mean age of the accused was 28.62 years. The minimum age was 13 years and maximum age was 64 years. The majority 78% was illiterate or just literate. A majority of accused were involved in multiple casual sexual relationships. There was relationship of exposure to casual multiple sexual encounters which showed two peaks one below 20 years and another over 40 years. An occasional intake of alcohol was seen in 72% cases compared to regular drinkers being 20%. Exposure to pornography was seen in overwhelming 78% cases. This exposure showed more numbers in persons below 25 years, when the exposure to pornography was cross-tabulated with history of exposure to multiple casual sexual relationships. However, chi-square test done with the same factors did not show a significant association (p value not significant). In view of the high prevalence of rape, prevention strategies need to focus on the structural and social risk factors, and prevention of perpetration of rape from ever occurring, rather than relying on prevention through responses.

Keywords: POCSO 2012-sociodemographic factors-accused perpetrators

INTRODUCTION

Rape, which is defined as physically forced or otherwise coerced penetration of the vulva or anus, violates victims' human rights and causes enduring health problems.¹ Victims are often wives or girlfriends, but can also be men, and in some settings rape of a non-partner woman is especially common.²

In today's world, moving at a fast pace the mind is no longer at a state of tranquility and peace. Man finds himself exposed to the temptations and vicissitudes of various evils. Following the Nirbhaya rape and murder case when the whole country stood up in unison, the issue hogged national limelight creating tumultuous reaction. A movement has been augmented to fight against these heinous crimes.

Often power and position lead to a state of mind where exploitation of the weakest and most vulnerable of our society. This often forms a sort of mental purge for those so inclined to take advantage of their positions of trust. Thus, child abuse has become a common though detestable offence. To deal with child sexual abuse cases, the Government of India has brought in a special law, namely, The Protection of Children from Sexual Offences (POCSO) Act, 2012. The Act has come into force with effect from 14th November 2012 along with the rules framed there under.

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The POCSO Act, 2012 is a comprehensive law to provide for the protection of children from the offences of sexual assault, sexual harassment and pornography, while safeguarding the interests of the child at every stage of the judicial process by incorporating child-friendly mechanisms for reporting, recording of evidence, investigation and speedy trial of offences through designated special courts.

The national crime record bureau figures of 2012 show that 12.67% of crimes against women are in West Bengal with an incidence of 2046 rape cases.

Sexual assault victims had different characteristics according to the time between the sexual assault and the examination. Public health campaigns against sexual abuse and rape as well as medical management of the sexually assaulted victims should adapt to the needs and the characteristics of these two different populations of victims. Crime against women is grossly underreported, in India.⁷

Population-based studies indicate that up to 37% of men in South Africa have ever raped a woman, but the global evidence base for rape perpetration is very small.²⁻⁷

Previous works on the topic conducted in various developing countries of the world have shown various socio demographic factors to have a significant influence in men who have been perpetrators of rape.^{4-6, 13}

The only large population-based study of rape that has been published in peer-reviewed literature was undertaken in South Africa. Elsewhere, most research was done with incarcerated offenders and college students. Notwithstanding these limitations, research from North America and South Africa, summarized in a recent systematic review, suggests that key risk factors for rape perpetration include adverse childhood experiences (abuse), attachment and personality disorders, social learning and delinquency (including gang membership), prevalent sex-inequitable ideals of masculinity that emphasize the importance of heterosexual performance, e.g., many sexual partners, including transactional sex, and to prove male sexual prowess and control of women (including with physical violence), and substance misuse.^{2,6,8-11}

In a country where history regarding sexual relationships, exposure to various factors like pornography are shrouded by taboos a population based study of aforesaid factors

are difficult to conduct and in this scenario it was thought imperative that a study be conducted to study the socio demographic profile and personal traits of the persons accused of assault under the POCSO Act, 2012.

MATERIAL AND METHODS

The present work was conducted in the Burdwan Medical College, Burdwan, WB in the Department of Forensic and State medicine. Study was conducted on the male accused of sexual assault under POCSO act 2012, brought for examination between 1st February 2014 and 31st January, 2015. In this 12 month study period those accused, who were brought for examination, completed a pretested and predesigned questionnaire administered verbally by the doctors who examined them. Their responses were noted after obtaining their consent. The results were analyzed and reported.

RESULTS

Total 50 cases were examined under POCSO act 2012. The data obtained was analyzed using SPSS version 19 software. Though none of the accused admitted to their crime they voluntarily gave data and information regarding their socio demographic profile except in case of sexual history, which was given on most occasions with reluctance. The age was normally distributed in the population was seen using Q-Q plot (**Figure 1**) and Shapiro Wilk test (**Table 2**). The mean age of the accused was 28.62 years. The minimum age was 13 years and maximum age was 64 years (**Table 1**). The majority (78%) was illiterate or just literate. A majority of accused were involved in multiple casual sexual relationships. Chart shows relationship of exposure to casual multiple sexual encounters which showed two peaks one below 20 years and another over 40 years. An occasional intake of alcohol was seen in 72% cases compared to regular drinkers being 20%. Exposure to pornography was seen in overwhelming 78% cases. This exposure showed more numbers in persons below 25 years.

When the exposure to pornography was cross-tabulated with history of exposure to multiple casual sexual relationships an increased association was found. However chi-square test done with the same factors did not show a significant association (**Table 7**) (p value was > .05). The result of relation between the various factors is shown in the following **Figures (2-8)** and **Tables (3-8)**.

Table 1 Descriptive statistics

	Number	Minimum	Maximum	Mean	Std. Deviation
age	50	13.00	64.00	28.6200	13.96627

Table 2 Tests for normality of data

Age	Kolmogorov-Smirnov			Shapiro-Wilk		
	Statistic	df	Sig.	Statistic	df	Sig.
	.222	50	.000	.844	50	.000

Table 3 Exposure to pornography with the accused

Pornography Exposure	Frequency	Percent	Valid Percent	Cumulative Percent
Exposed to pornography	39	78.0	78.0	78.0
Not exposed	11	22.0	22.0	100.0
Total	50	100.0	100.0	

Table 4 Educational status of accused

Educational Level	Frequency	Percent	Valid Percent	Cumulative Percent
Illiterate	18	36.0	36.0	36.0
Just Literate	21	42.0	42.0	78.0
Primary School	4	8.0	8.0	86.0
High School	4	8.0	8.0	94.0
Above High School	3	6.0	6.0	100.0
Total	50	100.0	100.0	

Table 5 Showing relation of occupation with pornography
Cross tabulation

Occupation	Exposed To Pornography	Not Exposed	Total
Unemployed	12	1	13
Self Employed	23	9	32
Service	3	2	5
Total	38	12	50

Table 6 Alcohol * history of exposure Cross-tabulation

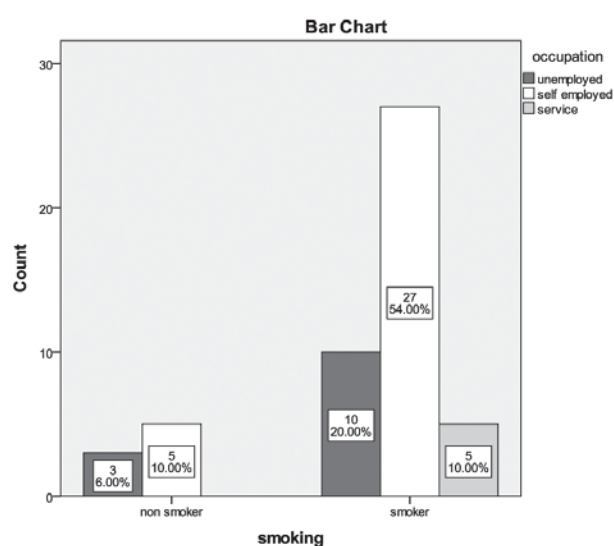
Alcohol	History of Exposure			Total
	No Exposure	Single Partner	Multiple Partners	
Non Alcoholic	2	1	1	4
Occasional Drinker	3	9	24	36
Regular Drinker	0	5	5	10
Total	5	15	30	50

Table 7 Showing chi square test for the variables

	Value	df	Asymp. Sig. (2-sided)	Exact Sig. (2-sided)	Exact Sig. (1-sided)
Pearson Chi-Square	.414 ^a	1	.520		
Continuity Correction	.086	1	.769		
Likelihood Ratio	.405	1	.524		
Fisher's Exact Test				.728	.378
Linear-by-Linear Association	.405	1	.524		
N of Valid Cases	50				

Table 8 Type of alcohol intake

Pattern of alcohol intake		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	non alcoholic	4	8.0	8.0	8.0
	occasional drinker	36	72.0	72.0	80.0
	regular drinker	10	20.0	20.0	100.0
	Total	50	100.0	100.0	

**Figure 2** Showing addiction to smoking

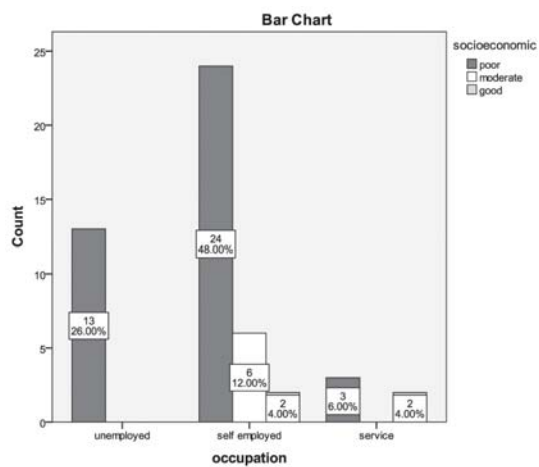


Figure 3 Showing socioeconomic status in relation to type of employment

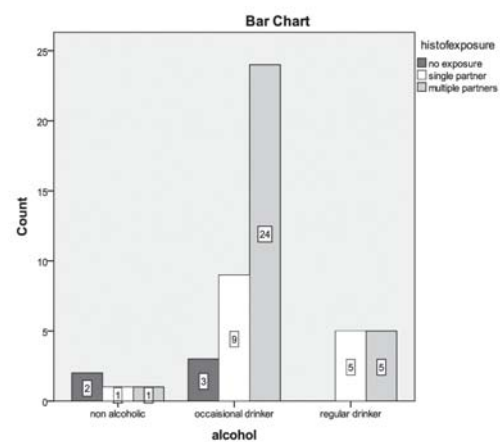


Figure 6 Relation of history of exposure to intake of alcohol

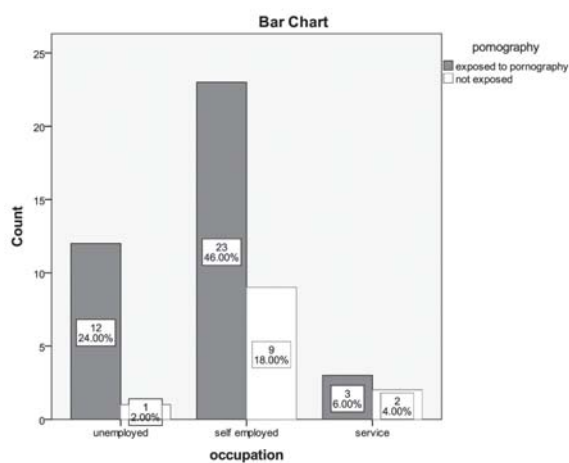


Figure 4 Showing relation of occupational status with exposure to pornography

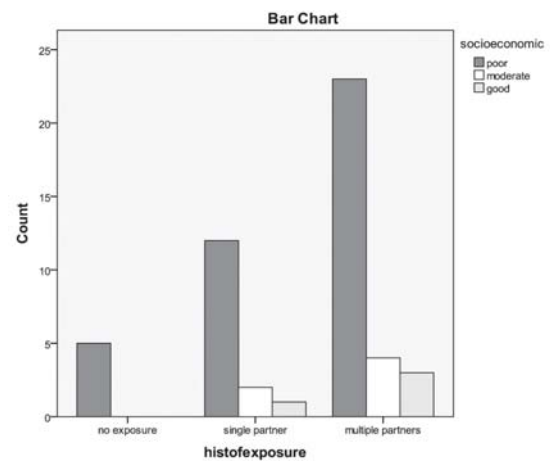


Figure 7 Relation of history of exposure to socioeconomic status

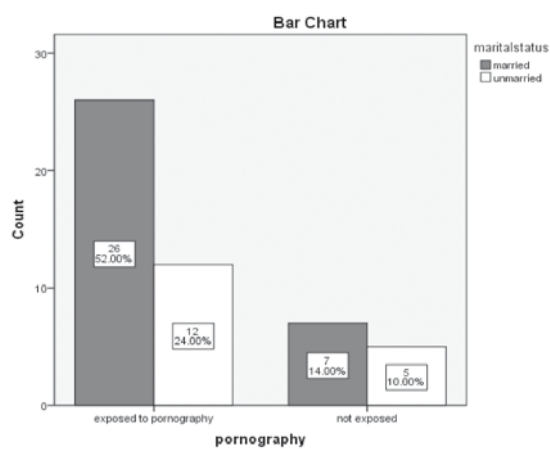


Figure 5 Showing relation of marital status with exposure to pornography

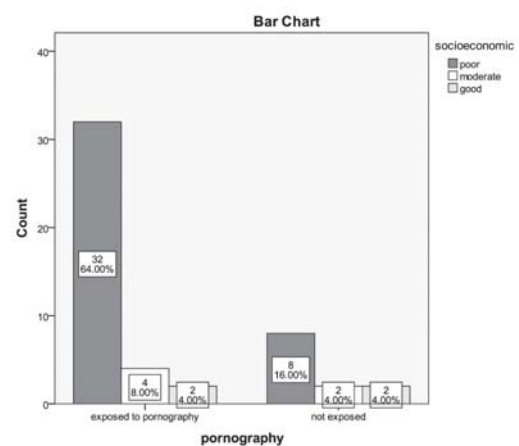


Figure 8 Relation of socioeconomic status with exposure to pornography

DISCUSSION

In the present investigation we have presented the results of a study from a small sample of population from the accused. From the analysis of the results, it could be seen that in persons who were addicted to pornography on a regular basis were more likely to be involved in the perpetration of rape. This finding is consistent with the studies previously done on the subject. Multiple casual sexual relationships also showed an association with the aggressors though the association was not statistically significant. The persons who were occasional in partaking of alcohol probably were more affected by the disinhibitor of alcohol. The persons who were regular drinkers were more habituated to its effects. It was seen that married persons (52%) were addicted to pornography and that with alcohol abuse were more associated with perpetrators of rape. This is in consonance with studies from Cambodia, China, Indonesia, and Papua New Guinea wherein alcohol misuse was associated with single and multiple non-partner rape perpetrations and intimate partner violence.¹³

Substantial research has been undertaken into the role of alcohol in rape perpetration. The emerging consensus is that it is a situational factor that reduces inhibitions. Alcohol misuse is often associated with particular dominant masculinities. This factor is reiterated by the findings of the present work.

The persons who were unemployed and therefore had more time to themselves probably indulged in drinking and participating in more recreational activities. The result of the present investigation also bears similarity to previous studies done on the perpetrators of rape done in developing countries like Africa and Botswana.

A majority (74%) were from the poor socioeconomic class. This observation was in congruence to previous studies in which poverty, indicated by present food insecurity and low educational attainment, was especially associated with multiple perpetrator rape and rape of men, and with physical and sexual partner violence.¹³

Poverty is more often associated with deprivation, neglect and thereby a subdued aggressive behavior. Couples with low self-esteem and values, those belonging to lower socioeconomic strata are the most vulnerable for indulging in sex crime. In situations of poverty, however, sub-cultures of gang membership and drug use can develop, which provides a context in which dominance over women and other men might be emphasized to compensate for otherwise perceived disempowerment.^{13,15,17} An association

was graphically seen between educational status, socioeconomic status and exposure to brothels. The association was however not significant when statistically tested by chi-square test.

CONCLUSION

Power related differences manifest not only in relationships but also in belief and structure of society. Premarital and multipartner sex though seen as breach of social norms is also said to be a fundamental dimension of gendered social organization. People consider it right among men to have an aggressive and adventurous sexual approach. This is more often resorted to, perpetrated and professed to confirm hegemonic masculinity. Men are expected to be dominant in a relationship and the findings of the present investigation show how pornography especially repeated exposure leads to liberal sexual attitudes and behavior among young people. Alcohol is commonly used as a disinhibitor specially when taken occasionally and a symbol of masculinity. This contributes to careless sexual behavior and higher rates of crime. We need better strategies to engage men, and better interventions to change their attitudes and behaviors related to power and control in relationships like having respect for women, having one sexual partner, use of condoms and knowledge regarding exposure risk of HIV. Their poverty needs to be addressed through income generating activities or programs that keep them at school. The government should regulate and monitor video shows and local brew dens to prevent exposure of youth to the deleterious effects of alcohol, drugs and pornography. To empower women through various social schemes reducing their dependence on men for economic needs. To promote risk free leisure activities like sports. Proper investigation of crimes and conviction of the offenders will act as a strong deterrent.

RECOMMENDATION

In view of the high prevalence of rape, prevention strategies need to focus on the structural and social risk factors, and prevention of perpetration of rape from ever occurring, rather than relying on prevention through responses. Take prompt legal action against errant to act as deterrent to others in future. Further research need to be designed to explore the behavioral pattern and health related determinants of those accused in sexual crime especially against children and minor girls. Promulgation of the POCSO act 2012 and its proper implementation will help the law enforcing agencies to ensure better protection

of this vulnerable age group. It is also emphasized that physicians are sensitized to the specific requirements and prescribed protocol for the examination of the accused and victim.

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REFERENCES

1. Etienne G Krug, James A Mercy, Linda L Dahlberg, Anthony B Zwi :World report on violence and health Lancet 2002; 360: 1083–88
2. Jewkes R, Sikweyiya Y, Morrell R, Dunkle K. Gender inequitable masculinity and sexual entitlement in rape perpetration South Africa: findings of a cross-sectional study. *PloS One* 2011;6: e29590. doi: 10.1371/journal.pone.0029590. Epub 2011 Dec 28
3. Fleming PJ, McCleary-Sills J, Morton M, Levkov R, Heilman B, Barker G (2015) Risk Factors for Men's Lifetime Perpetration of Physical Violence against Intimate Partners: Results from the International Men and Gender Equality Survey (IMAGES) in Eight Countries. *PLoS ONE* 10(3): e0118639
4. Machisa M, Jewkes R, Lowe-Morna C, Rama K. The war at home. Johannesburg: GenderLinks, 2011.
5. Senn CY, Desmarais S, Verberg N, Wood E. Predicting coercive sexual behaviour across the lifespan in a random sample of Canadian men. *J Soc Pers Relat* 2000;17:95–113.
6. Abbey A, Parkhill MR, BeShears R, Clinton-Sherrod AM, Zawacki T. Cross-sectional predictors of sexual assault perpetration in a community sample of single African American and Caucasian men. *Aggress Behav* 2006;32:54–67.
7. Mukhopadhyay Partha Pratim, Karmakar RN, Sarkar Debasish et al. Decadal change in pattern and demography of female victims of sex offence examined at Burdwan Medical College, Burdwan, and West Bengal, India: Myth versus reality. *Indian Journal of Forensic Medicine & Toxicology* 2010;4(1):31-5.
8. Sikweyiya Y and Jewkes R. (2009). "Force and temptation: contrasting South African men's accounts of coercion into sex by men and women". *Culture Health & Sexuality*, 11 (5): 529-541.
9. Mukhopadhyay Partha Pratim. The Criminal Procedure Code (Amendment) Act of 2005 and its relevance in examination of victim of sexual assault: good practice in medico legal perspectives. *Intl J of Medical Toxicology & Legal Medicine* 2012;14(3&4):133-138.
10. Gupta Saibal, Mukhopadhyay Partha Pratim, Chhetri D, Ghosh L. Medico legal study of the victims of Sexual Assault. *J Indian Acad Forensic Med* 2003;25(1):27-31.
11. Muram D, Hostetler BR, Jones CE, Speck PM: Adolescent victims of sexual assault. *J of Adolesc Health* 1995 Dec;17(6):372-5

ORIGINAL PAPER

Cheiloscopy as a Tool for Identification

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ABSTRACT

Establishing the identity of the living or the deceased, which is an essence of any crime investigation, is one of the most challenging matters that forensic science has to deal with. Cheiloscopy is one of the newly emerging tools that aid in this. It is the study of the grooves present on the human lips, at the zone of transition of outer skin and inner labial mucosa. The present study was conducted in the Department of Anatomy, Gauhati Medical College, Guwahati, Assam, amongst a group of 145 1st MBBS students comprising of 89 males and 56 females, with an aim to determine the predominant lip print pattern in different lip quadrants and also to find out any similarity in distribution of lip print patterns in different quadrants in males and females. The prints were analysed after dividing the lips into four quadrants: right upper as Quadrant I, left upper as Quadrant II, left lower as Quadrant III, and right lower as Quadrant IV. The patterns were analyzed following the classification of Suzuki and Tsuchihashi. The recorded data were then statistically analysed using Student's T-test. P value ≤ 0.05 is considered as statistically significant. The data obtained in this study hopes to contribute to the knowledge and understanding of the uniqueness and distribution of lip prints and in turn help in certain medico-legal practices.

Keywords: Cheiloscopy, Lip print, Identification

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INTRODUCTION

'Identity' is a set of physical characteristics, functional or psychic, normal or pathological, that defines an individual.¹ Establishing the identity of the living or the deceased is an essence of any crime investigation. This is one of the most challenging matters that forensic science has to deal with considering the fact that every individual has distinctive traits.² Cheiloscopy is one of the newly emerging tools that aid forensic experts in establishing the identity of an individual.³ The grooves or furrows present on the human lips, which are also known as *Sulci Labiorum* are unique to each person.⁴ Cheiloscopy is the study of these grooves present at the zone of transition of outer skin and inner labial mucosa (Etymology: from the Greek word '*Cheilos*' which means lips and '*scopy*' which means to study or to examine).⁵⁻⁸ It is possible to identify lip print patterns as early as the sixth week of intra-uterine life. Thereafter, these patterns rarely change. Literature suggests that even following trauma, the lips retain the groove pattern after healing.⁹

R. Fischer was the first anthropologist to describe the furrows on human lips in 1902.^{6,10-12} However, the use of lip prints for personal identification was first recommended by French criminologist, Edmond Locard in 1932.^{1,3,5} In 1960, Dr. Martin Santos devised a simple system for classifying lip prints.^{9,13-15} In 1967, Suzuki made a detail investigation of the measurement of lips, the use and the colour of rouge and method of its extraction to obtain useful data for forensic application. Later in 1971, Yasuo Tsuchihashi and Kazuo Suzuki conducted a study and they devised their own classification, which is the most widely accepted classification system of lip prints.¹⁰⁻¹⁴

Aims: (i) To determine the predominant lip print pattern in different lip quadrants in males and females and (ii) To

find out any similarity in distribution of lip print patterns in different quadrants in males and females.

MATERIAL AND METHODS

Materials:

1. A dark coloured frosted lipstick (Elle18: Jamm)
2. Cellophane tape - 2 inches wide.
3. White bond paper (Royal Executive Bond, Premium White A4 sheets)
4. Magnifying glass (10X)
5. Pen for labelling individual details.

Method:

The present study has been conducted in the Department of Anatomy, Gauhati Medical College, Guwahati, Assam, amongst a group of 145 1st MBBS students comprising of 89 males and 56 females between the age group of 18 to 23 years, having different ethnic backgrounds, after approval of the Institutional Ethical Committee. All the participants were briefed about the purpose of the study and written informed consent was also taken from them. Care was taken to select individuals having no lesions, whether active or passive on the lips. Also, individuals with known hypersensitivity to lipsticks, or other physical disability were not included in the study.

Collection of Prints:

The subject was asked to open the mouth and lipstick was applied on the vermillion border with a single stroke. Following two minutes of waiting, the glued portion of the cellophane tape was applied to the lips by applying gentle pressure for a few seconds. Then the tape was carefully lifted from the lips, from one end to the other, avoiding any smudging of the print. This strip of cellophane was then stuck on to a white A4 sheet. This served as a permanent record of the lip print.

Analysis of Prints:

The recorded prints were studied with a magnifying lens. These were analyzed after dividing the lips into four quadrants: right upper as Quadrant I, left upper as Quadrant II, left lower as Quadrant III, and right lower as Quadrant IV. The patterns were analyzed following the classification of Suzuki and Tsuchihashi (**Table 1**, **Figure 1**).¹⁰

Table 1 Classification of lip prints according to Suzuki and Tsuchihashi¹⁰

TYPE	DESCRIPTION
Type I	Clear-cut vertical grooves that run across the entire lip
Type I'	The grooves are straight but disappear half way instead of covering the entire breadth of the lip
Type II	The grooves fork/branch in their course (Y-pattern)
Type III	The grooves intersect
Type IV	The grooves are reticular
Type V	Undetermined, i.e. the grooves do not fall into any of the Types I – IV

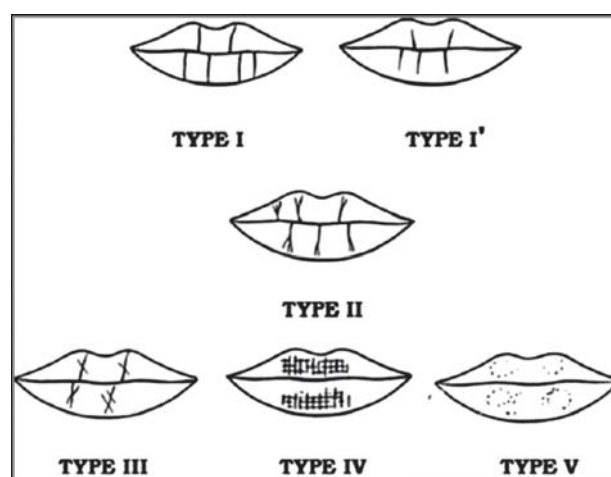


Figure 1 Classification of lip prints as proposed by Suzuki and Tsuchihashi¹⁰ (1970)

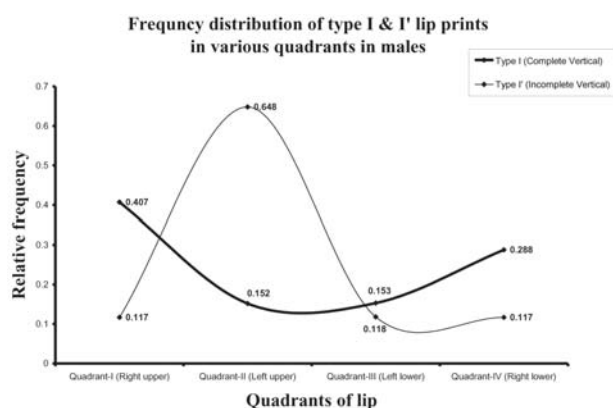
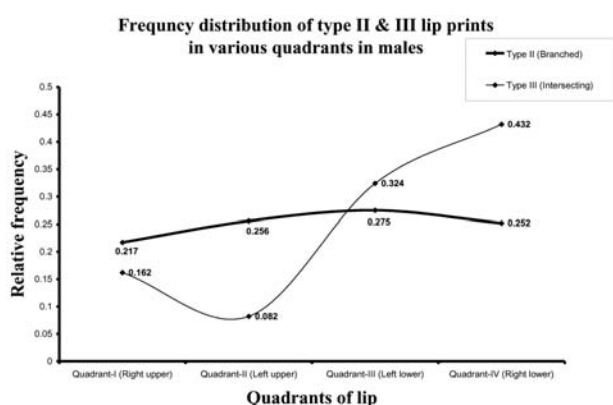
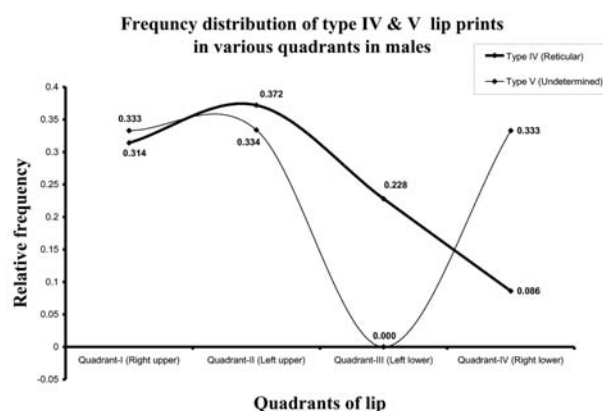
The recorded data were then statistically analysed using Student's T-test. P value ≤ 0.05 was considered as statistically significant.

OBSERVATION AND RESULTS

In the present study it was seen that in males, in Quadrant I i.e. right upper quadrant, Type I (complete vertical) was the most predominant pattern with a relative frequency (fr) of 0.407 and Type I' (incomplete vertical) was the least common pattern with a relative frequency (fr) of 0.117. In Quadrant II i.e. left upper quadrant, Type I' was the most common pattern (fr= 0.648) and Type III the least common pattern (fr=0.082). Quadrant III, i.e. left lower quadrant showed Type III as the most common pattern with fr = 0.324 and Type V the least common pattern (fr=0). In Quadrant IV i.e. right lower quadrant, Type III (fr=0.432) and Type IV (fr=0.086) were the most and least common pattern respectively. [**Table 2**, **3** & **Figure 2(a)**, **2(b)** & **2(c)**.]

Table 2 Male cases with different lip print patterns in different quadrants

Quadrants	Type I (Complete Vertical)	Type I' (Incomplete Vertical)	Type II (Branched)	Type III (Intersecting)	Type IV (Reticular)	Type V (Undetermined)
I	24	2	45	6	11	1
II	9	11	53	3	13	1
III	9	2	57	12	8	0
IV	17	2	52	16	3	1
Sum	59	17	207	37	35	3
Mean	14.75	4.25	51.75	9.25	8.75	0.75
SD	±7.228	±4.500	±4.992	±5.852	±4.349	±0.500
SEM	±3.614	±2.250	±2.496	±2.926	±2.174	±0.250

**Figure 2(a)** Relative frequency distribution**Figure 2(b)** Relative frequency distribution**Figure 2(c)** Relative frequency distribution**Table 3** Relative frequency of different types of lip prints in various quadrants in males

Class interval of different quadrants	Type I (Complete Vertical)	Type I2 (Incomplete Vertical)	Type II (Branched)	Type III (Intersecting)	Type IV (Reticular)	Type V (Undetermined)
Quadrant I (Right upper)	0.407	0.117	0.217	0.162	0.314	0.333
Quadrant II (Left upper)	0.152	0.648	0.256	0.082	0.372	0.334
Quadrant III (Left Lower)	0.153	0.118	0.275	0.324	0.228	0.000
Quadrant IV (Right lower)	0.288	0.117	0.252	0.432	0.086	0.333
SUM	1.000	1.000	1.000	1.000	1.000	1.000

In **Table 3** we have seen that in Type I, Type II, Type III, Type IV and Type V, the highest relative frequency can be seen respectively as, 0.407 (Quadrant I), 0.648 (Quadrant II), 0.275 (Quadrant III), 0.432 (Quadrant IV), 0.372 (Quadrant II) and 0.0334 (Quadrant II), which is evident in **Figure 2(a), 2(b) & 2(c)**.

In case of females, it was observed that in Quadrant I, Type I (incomplete vertical) was the most predominant pattern with a relative frequency (fr) of 0.384 and Type V (undetermined) was the least common pattern with a relative frequency (fr) of 0.000. In Quadrant II, Type V was the most common pattern (fr=1.000) and Type I (fr=0.096) the least common pattern. Quadrant III, showed Type I as the most common pattern (fr=0.290) and Type V (fr=0) the least common pattern. In Quadrant IV, Type

III ($fr=0.384$) and Type V ($fr=0$) are the most and least common patterns respectively [Table 4, 5 & Figure 3(a), 3(b) & 3(c)].

Table 4 Female cases with different lip print patterns in different quadrants

Quadrants	Type I (Complete Vertical)	Type I' (Incomplete Vertical)	Type II (Branched)	Type III (Intersecting)	Type IV (Reticular)	Type V (Undetermined)
I 9	5	30	5	7	0	
II 3	6	30	4	10	2	
III 9	0	37	7	4	0	
IV 10	2	31	10	1	0	
Sum	31	13	128	26	22	2
Mean	7.75	3.25	32	6.5	5.5	0.5
SD	± 3.202	± 2.754	± 3.367	± 2.646	± 3.873	± 1.000
SEM	± 1.601	± 1.377	± 1.683	± 1.323	± 1.936	± 0.500

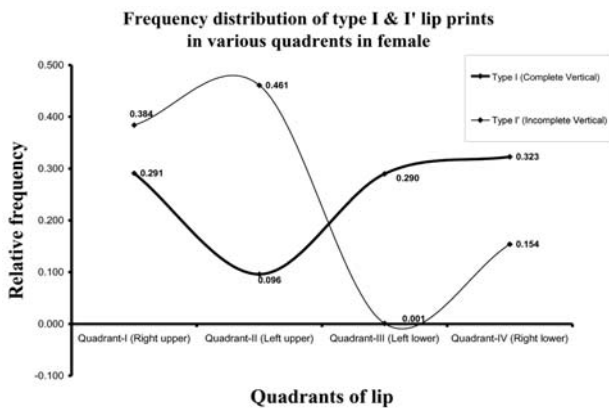


Figure 3(a) Relative frequency distribution

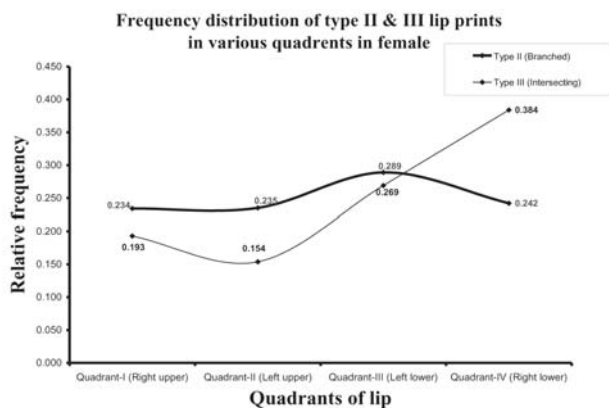


Figure 3(b) Relative frequency distribution

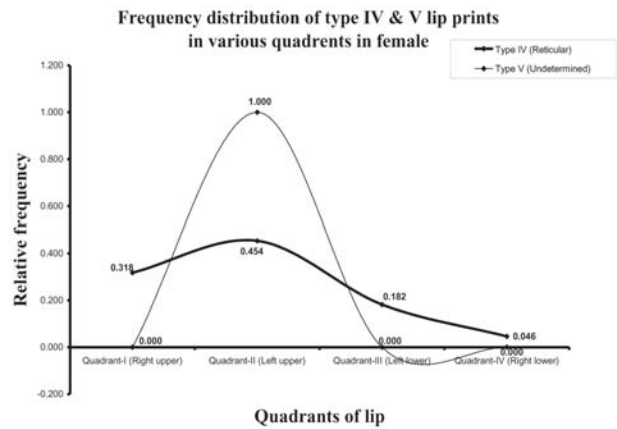


Figure 3(c) Relative frequency distribution

Table 5 'Relative frequency' of different types of lip prints in various quadrants in females

Class interval of different quadrants	Type I (Complete Vertical)	Type I2 (Incomplete Vertical)	Type II (Branched)	Type III (Intersecting)	Type IV (Reticular)	Type V (Undetermined)
Quadrant I (Right upper)	0.291	0.384	0.234	0.193	0.318	0.000
Quadrant II (Left upper)	0.096	0.461	0.235	0.154	0.454	1.000
Quadrant III (Left Lower)	0.290	0.001	0.289	0.269	0.182	0.000
Quadrant IV (Right lower)	0.323	0.154	0.242	0.384	0.046	0.000
SUM	1.000	1.000	1.000	1.000	1.000	1.000

In Table 5 we have seen that in Type I, Type II, Type III, Type IV and Type V, the highest relative frequency can be seen respectively as, 0.323 (Quadrant IV), 0.461 (Quadrant II), 0.289 (Quadrant III), 0.384 (Quadrant IV), 0.454 (Quadrant II) and 1.000 (Quadrant II) which is evident in Figure 3(a), 3(b) & 3(c).

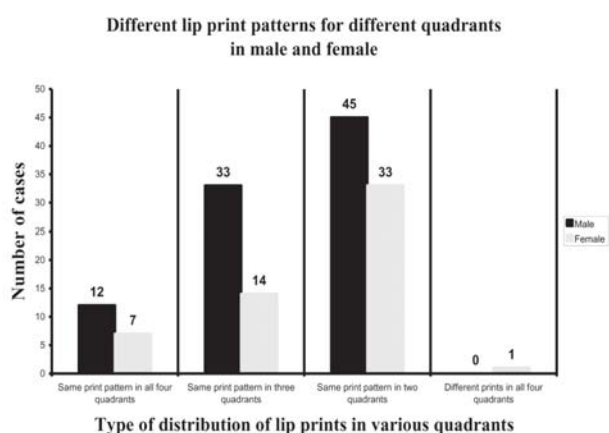


Figure 4 Comparison of lip print patterns in different quadrants in males and females

Table 7 Level of significance of differences

Sl. No.	Comparison of mean between	"t"	P
1	Number of male cases in Type II (Branched) and Type I (Complete vertical)	8.424	<0.001
2	Number of male cases in Type I (Complete vertical) and Type III (Intersecting)	1.183	>0.05
3	Number of male cases in Type III (Intersecting) and Type IV (Reticular)	0.137	>0.05
4	Number of male cases in Type IV (Reticular) and Type I2 (Incomplete vertical)	1.438	>0.05
5	Number of male cases in Type I2 (Incomplete vertical) and Type V (Undetermined)	1.546	>0.05
6	Number of female cases in Type II (Branched) and Type I (Complete vertical)	10.443	<0.001
7	Number of female cases in Type I (Complete vertical) and Type III (Intersecting)	0.602	>0.05
8	Number of female cases in Type III (Intersecting) and Type IV (Reticular)	0.426	>0.05
9	Number of female cases in Type IV (Reticular) and Type I2 (Incomplete vertical)	0.947	>0.05
10	Number of female cases in Type I2 (Incomplete vertical) and Type V (Undetermined)	1.878	>0.05

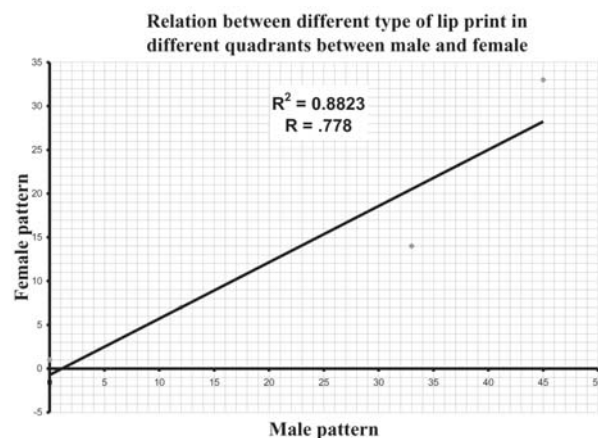


Figure 5 XY (Scatter) chart showing trend line & R value

There are various types of distribution of lip print patterns in the different lip quadrants as shown in **Figure 4**, but highest numbers of cases in both male and female category are seen as, “same print pattern in two quadrants” and lowest as “different print in all four quadrants”. However there is always a strong relation between these patterns in various quadrants in male and female ($R = 0.778$) as shown in **Figure 5**.

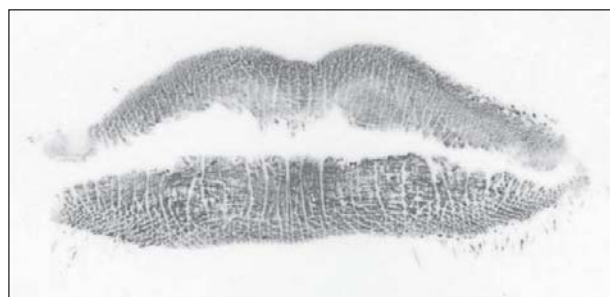


Figure 8 Lip print of a female showing type II, I, IV & IV in quadrants I, II, III & IV respectively.

DISCUSSION

Traditional methods of identification include anthropometry, fingerprinting, sex determination, age estimation, height measurement, blood group differentiation, DNA fingerprinting, odontology, etc.⁸ Study of lip prints, i.e. cheiloscopy is emerging as an important tool to aid in personal identification since its inception in 1902. Cheiloscopy techniques have an equal value in relation to other methods of forensic evidence for personal identification.¹⁷ In a crime scene investigation, lip prints can link a subject to a specific location if found on clothes, or other objects such as glasses, cups or even cigarette butts.¹⁸

A number of studies have been conducted by various research workers in this field. Of these, Dr. Santos, Suzuki K. and Tsuchihashi Y deserve special mention, for their attempts in classifying lip prints, which are still followed worldwide.

In our present study, the distribution of lip prints in all the 145 subjects was distinct and unique. None of the patterns were identical in any two subjects. This finding is consistent with the findings of Suzuki K. and Tsuchihashi Y^{10,14}, Venkatesh R et al¹⁹, Multani S et al²⁰ and various other authors.¹

Further, lip prints did not comprise of a single type alone, but appear to be a combination of different patterns in all four quadrants. This is also consistent with the observations made by Tsuchihashi¹⁰ and Venkatesh R.¹⁹ When the similarity of print patterns in the different quadrants is considered, the present study is seen to correlate with the findings of Venkatesh R.¹⁹

CONCLUSION

From the present study it can be concluded that in males, when the quadrant-wise distribution of lip prints is considered, Type I was the most predominant pattern in Quadrant I. The most predominant patterns in Quadrant II, Quadrant III, and Quadrant IV were found to be Type I', Type III and Type III respectively.

Further, on considering all the four lip quadrants together, the number of cases with Type II (branched) pattern is much higher than the other varieties with very high significance ($p < 0.001$). Apart from Type II (branched) pattern, the number of cases in ascending to descending are, respectively, Type I, Type III, Type IV, Type I' and Type V, but all of these are without any significance ($p > 0.050$).

In females, it was observed that in Quadrant I, Type I was the most predominant pattern. In Quadrant II, Type V, Quadrant III Type I and Quadrant IV, Type III was the most common pattern.

The present study further concludes that when the quadrant-wise distribution of prints is considered in both sexes, all the four quadrants show different prints in 0.68% of the females. None of the male subjects showed different prints in all four quadrants. Similar print patterns were seen in all four quadrants in 8.3% males and 4.8% females. Similar patterns were found in three quadrants in 22.7% males and 9.6% females. Similarities in two quadrants were found in 31.03 % males and 22.7% females.

There are various types of distribution of lip print patterns in the different lip quadrants, but highest numbers of cases in both male and female category are seen as, "same print pattern in two quadrants" and lowest as "different print in all four quadrants". But there is always a strong relation between these patterns in various quadrants in either sexes ($R = 0.778$).

It can thus be said that lip prints with its uniqueness may serve as an important tool in personal identification.

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Ethical clearance: Taken.

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REFERENCES

1. Vahanwala S, Nayak CD, Pagare SS. Study of lip prints as aid for sex determination. *Medico-legal Update* 2005;5(3):93-8.
2. Mutalik VS, Menon A, Jayalakshmi AK, Raghu AR. Utility of cheiloscopy, rugoscopy, and dactyloscopy for human identification in a defined cohort. *Journal of Forensic Dental Sciences* 2013;5(1):2-6.
3. Bansal N, Sheikh S, Bansal R, Pallagati S. Correlation between lip prints and fingerprints in sex determination and pattern predominance in 5000 subjects. *Journal of Forensic Odonto-stomatology* 2013 December;31(1):8-14.
4. Rohit M, Sumit G. Cheiloscopy: A deterministic aid for forensic sex determination. *Journal of Indian Academy of oral medicine and radiology* 2011;23:17-9.

5. Malik R, Goel S. Cheiloscropy: a deterministic aid for forensic sex determination. *Journal of Indian Academy of Oral Medicine and Radiology* 2011 January-March;23(1):17-9.
 6. Kasprzak J. Cheiloscropy. In: Siegel JA, Saukko PJ, Knupfer GC, editors. *Encyclopedia of forensic sciences*. 2nd ed. London: Academic Press; 2000. p.358-61.
 7. Kasprzak J. Possibilities of cheiloscropy. *Forensic Sci Int* 1990;46:145-51.
 8. Tsuchihashi Y. Studies on personal identification by means of lip prints. *Forensic Sci* 1974;3:233-48.
 9. Dongarwar GR, Bhowate RR, Degwekar SS. Cheiloscropy-method of person identification and sex determination. *Scientific reports* 2013;2(3):213-7.
 10. Suzuki K, Tsuchihashi Y. New attempt of personal identification by means of lip print. *JIDA* 1970;42:8-9.
 11. Caldas IM, Magalhaes T, Afonso A. Establishing identity using cheiloscropy and palatoscopy. *Forensic Sci Int* 2007;165:1-9.
 12. Sivapathasundharam B, Prakash PA, Sivakumar G. Cheiloscropy. *Indian I dent Res* 2001; 12:234-7.
 13. Ball J. The current status of lip prints and their use for identification. *J Forensic Odontostomatol* 2002;20:43-6.
 14. Suzuki K., Tsuchihashi Y. Personal identification by means of lip prints. *J Forensic Med* 1970;17:52-7.
 15. Williams TR. Lip prints-another means of identification. *J Forensic Indent* 1991;41:190-4.
 16. Prabhu RV, Dinkar AD, Prabhu VD, Rao PK. Cheiloscropy: revisited. *J Forensic Dent Sci* 2012;4(1):47-52.
 17. Bindal U, Jethani SL, Mehrotra N, Rohatgi RK, Arora M, Sinha P. Lip prints as a method of identification in human being. *J Anat Soc* 2009;58:152-5.
 18. Singh NN, Brave VR, Khanna S. Natural dyes versus lysochrome dyes in cheiloscropy: a comparative evaluation. *J Forensic Dent Sci* 2010;2:11-17.
 19. Venkatesh R, David MP. Cheiloscropy: an aid for personal identification. *J Forensic Dent Sci* 2011 Jul-Dec;3(2):67-70.
 20. Multani S, Thombre V, Thombre A, Surana P. Assessment of lip print patterns and its use for personal identification among the populations of Rajnandgaon, Chhattisgarh, India. *J Int Soc Prev Community Dent* 2014 Sep-Dec;4(3):170–4.
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ORIGINAL PAPER

Knowledge, Attitude and Practice of Self Medication Among Nurses and Midwives of a Tertiary Care Hospital

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ABSTRACT

Self medication is one of the rapidly growing areas of concern to medical professionals, government and the general public. The study was aimed at assessing the magnitude and factors of self medication among the nurses and midwives of Gauhati Medical College and Hospital. The participants were explained the purpose of study and requested to fill up three sets of questionnaires each of knowledge, attitude and practice. Out of a total of 150 nurses, 90 (60%) of them reported of one episode of an illness and 60 (40%) of them practiced self-medication. Most drugs for self-medication were obtained from the pharmacy or drug shops and the most commonly self medicated drugs were Paracetamol, Aspirin, and Pantoprazole. They took this for common illness like fever (20%), headache (30%) followed by common cold and cough (20%). They even took Azithromycin (1 %) for respiratory tract infection. Non-seriousness of their illness with previous experience attributed them for self medication which is facilitated by easy availability of drug and information from textbooks or seniors. Self-medication is one of the rapidly growing areas of concern to medical professional, government and general public. Self-medication among the nurses and mid-wives was practiced with a range of drugs from the conventional drugs for fever (paracetamol) to the antibiotics. Although the practice of self-medication is inevitable, the drug authorities and health professionals need to educate nurses and midwives about the pros and cons of self-medication

Keywords: Conventional drugs, Pharmacy, Questionnaires, General public, Textbooks, Senior

INTRODUCTION

Self-medication involves the use of medicinal products by the individuals to treat self-recognized disorders or symptoms, or the intermittent or continuous use of a medication prescribed by a physician for chronic or recurring diseases or symptoms.

Self-medication involves acquiring medicines without a prescription, resubmitting old prescriptions to purchase medicines, sharing medicines with relatives or members of one's social circle or using leftover medicines stored at home.¹ Self-medication thus forms an integral part of self-care, which can be defined as the primary public health resource in the health care system. It includes self-medication, non-drug self-treatment, social support in illness, and first aid in everyday life.

Use of self-medication is highly prevalent in both urban and rural community varying from 32.5% to 81.5%.² The practice of self-medication in the general population in the form of OTC (over the counter) drugs has been on a rapid rise. Unaware of the appropriate drugs for the particular illnesses, their doses, and adverse effects, the misuse of medications as prescribed by the pharmacist, or a family member, or anyone in general may lead to such people literally playing with their lives at their own mercy.

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But with illiteracy, there is no stop to this. On the contrary, the situation is entirely different in the case of medicos/dental or nursing students.³

Studies on self-medication show that it is influenced by many factors, such as education, family, society, law, availability of drugs and exposure to advertisements.^{4,5} A high level of education and professional status have been mentioned as predictive factors for self-medication.⁶ Self-medication has both benefits and risks. Responsible self-medication can save scarce medical resources from being wasted on minor conditions, reduce the burden on health care facilities, and decrease the cost and time people spend to visit health care facilities for minor symptoms. However, inappropriate self-medication can have a number of potential risks for example delay in seeking appropriate medical advice; failure to recognize or self-diagnose contraindications, interactions with prescribed medicinal products; failure to report current self-medications to the prescribing physician (risk of double medication and/or harmful interaction inappropriate duration of use of medicine; risk of dependence and abuse, etc.).^{6,7,8}

The dangers of self-medication are many such as habituation, allergic reactions that may be severe or even fatal. Under-dosage may not cure the symptom. Over-dosage can produce collateral damage to many organs. By masking the symptom temporarily, it will be difficult for a doctor to arrive at a correct diagnosis. NSAID drugs like ibuprofen increase the risk of stroke.⁶

Self-medication is an important health issue especially in developing countries. Various studies reported that self-medication may lead to delay in care seeking which results in paradoxical economic loss due to delay in the diagnosis of underlying conditions and appropriate treatment. Also, self-medication can lead to interaction between drugs which would be prevented, had the patient sought care from a licensed medical practitioner. Practicing self-medication for drugs like antibiotics might lead to drug resistance; and hence, there needs to be a check on these practices.⁹

The study of self-medication practice among nurses and midwives is very important, as they are a segment of the population that has access to information regarding their health. Self-medication is practiced with a range of drugs from the conventional analgesic to antibiotics. Although the practice of self-medication is inevitable; drug authorities and health professionals need to educate nurses and midwives about the pros and cons of self-

medication. Self-medication is a very widespread practice among nurses and midwives. Several studies have addressed the way doctors and medical students engage in this practice. Only few researches have been carried out in our part of population and it is essential to study in our context the practice among nurses and midwives. So, we have selected this topic. Therefore, self-medication has many demerits which may directly harm to our physical as well as mental health. In this study, we have studied about self-medication among nurses and midwives of Gauhati Medical College. Firstly, we have sought to estimate the prevalence of self-medication. Secondly we have sought to determine the knowledge, attitude and behavior of self-medication.¹⁰

MATERIALS AND METHODS

This study was across - sectional, questionnaire based survey. It was a 6-month study undertaken from the month of May 2015 to Nov 2015. A self developed, pre-validated questionnaire was used. The study population comprised of nurses and midwives of Gauhati Medical College. The participants were explained the purpose of the study and requested to fill up three sets of questionnaires each of knowledge, attitude and practice. A brief description of the nature of the study and the procedure of completing the questionnaire was explained to them, the time given for filling up the form (Questionnaire) was half an-hour. The survey was descriptive and data was summarized as counts and percentage.

RESULTS AND OBSERVATION

Out of 150 nurses and midwives mostly was General Nursing Midwives from rural background followed by ANM and BSC nursing.

Knowledge: 80% of the participants had good knowledge on self-medication. Books (43.3%) were the most common source of information followed by internet (23.3%) and other sources. Most of them knew about the adverse reactions that might occur due to inappropriate medication though they were not able to specify the particular reaction for the individual drugs.

Attitude: The majority of the participants had a positive attitude towards self-medication. Regarding a change in attitude about self-medication same results were obtained i.e. 45% of the Nursing Midwives were not in favour to change their attitude about self-medication whereas 40% were in favour of change in their attitude towards self-medication.

Practice: Out of 150 participants all practiced self-medication. The common reasons for self medication was saving time (55.6%), doing away with the need to go to a doctor for a minor illness (33.4%), being economical (7.7%) and providing quick relief (3.3%). Headache (72%) was the most common symptom for which self medication was practiced followed cold (57.3%), fever (56%) etc. 53% use self-medication for themselves only, 35.6% practiced self-medication for themselves and family member as well and 11.4% use for someone else (friends, neighbors).

Table 1 Respondents Socio-Demographic Characteristics N=150

AGE IN YEARS	EDUCATION	BACKGROUND
21-25	55	ANM 50 Rural 96
26-30	40	GNM 75 Urban 54
30-35	45	BSc (Nursing) 25
35-40	10	

Table 2 Showing source of information regarding drugs (N = 150)

Television	15
Books	65
Internet	35
Print media	10
Friends/Relatives	10
Past exposure	15

Table 3 Reported symptoms

REPORTED SYMPTOMS	FREQUENCY
Headache	108
Cold	86
Fever	84
Diarrhea	30
Sinusitis	15
Insomnia	10

Table 4 Respondent's level of knowledge on self-medication

POOR KNOWLEDGE	30
GOOD KNOWLEDGE	120



Figure 1 Respondents Socio-Demographic Characteristics in percentage

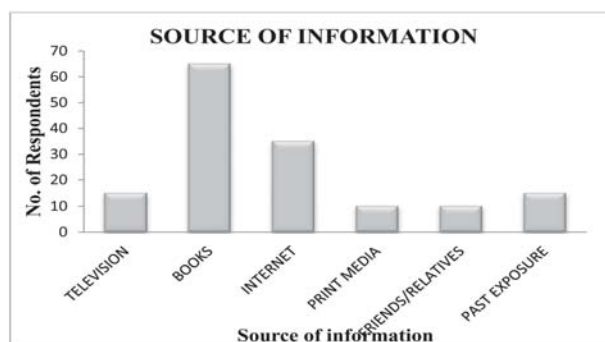


Figure 2 Showing source of information regarding drugs

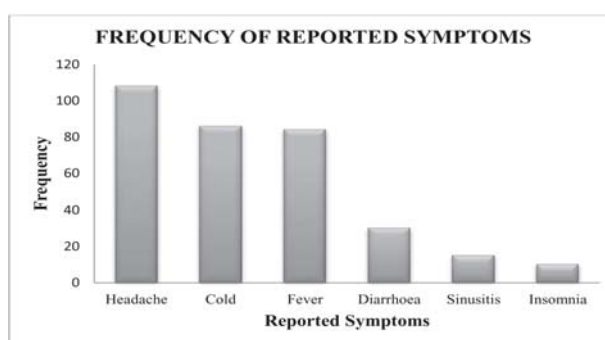


Figure 3 Showing frequency of reported symptoms

DISCUSSION

The International Pharmaceutical Federation defines self-medication as the use of non-prescription medicines by people on their own initiative.

Self-medication is considered an element of self-care.¹¹ Self-care, including self-medication, has been a feature of healthcare for many years and people have always been keen to accept more personal responsibility for their health status. The present study was conducted to evaluate the practices, attitude and perception of self-medication among nursing staff. The prevalence of self-medication in our study was found to be 100%.

In our study the most common reason for self-medication reported by a large number of participants was that it increases the knowledge regarding drugs and their use. Even if most of the participants had good knowledge on the various drugs and their pharmacology, they practiced self-medication with improper dosage and duration. This study is congruence with the study done by James, Handu, Khaja and Otoom,¹² which shows majority of participant, had fairly good knowledge. This could also mean that they had knowledge about side effects, advantages and disadvantages, which they have learned from their academic courses. There was also increase use

of antibiotics in an irrational manner with improper dose, dosage and duration. Antipyretics & analgesics were the most common class of drugs self-medicated by majority of the participants in our study. Paracetamol and other types of NSAIDs were the most common type of analgesics used for self-medication. This is similar to the study conducted by James, Handu, Khaja and Otoom¹² which shows analgesics (81.3%), antipyretics (43%), antibiotics (6%) and antihistamine (13%). Headache (72%) was the most common symptom in our study for which self medication was practiced This study was however different from the findings of Pandya R.N. where 52.5% respondent use medicines for cold/cough, 54% respondent for pain and 48.72% for fever¹³ and in studies from Western¹⁴ and Southern part of India¹⁵, cough & cold was the most common symptom for self-medication.

CONCLUSION

The study showed that nurses during their daily duties became more aware about drugs, their uses, adverse effects and contraindications. This helped them practice self-medication. However, even though most of the nurses still feared having adverse effects due to self-medication, yet not many had any experience. This descriptive study has found that self-medication is very common among nurses, facilitated by the easy availability of drugs and information from textbook. Since inappropriate self-medication has the potential to cause serious harm, not only to nurses themselves but also to those whom they suggest medication. The respondents showed good knowledge towards self-medication and positive attitude towards self-medication favoring it as acceptable. Analgesic and antipyretic were most commonly used drugs. Prevalence of self-medication was high due to minor illness. Although the self-medication practice is inevitable; there is great responsibility of drug regulatory authorities in this regard.

Conflict of interest: None declared.

Ethical clearance: Taken.

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REFERENCES

1. Essential medicines and health products information portal. Guidelines for the regulatory assessment of medicinal products for use in Self-medication. Geneva: World Health Organization; 2000.
2. Loyola Filho AI, Lima-Costa MF, Uchôa E. Bambuí Project: a qualitative approach to self- medication. *Cad Saude Publica* 2004;20(6):1661–1669.
3. Khandelwal S, Deb D, Gonsalves J. Practice of self-medication among medical students in Manipal. *Int Res J Pharm App Sci* 2013;3(5):175-179.
4. Montastruc JL, Bagheri H, Geraud T, Lapeyre MM. Pharmacovigilance of self-medication. *Therapie* 1997;52:105-110.
5. Hebeeb GE, Gearhart JG. Common patient symptoms: patterns of self treatment and prevention. *J Miss State Med Assoc* 1993;34:179–181.
6. Martins AP, Miranda AC, Mendes Z, Soares MA, Ferreira P, Nogueira A. Self-medication in a Portuguese urban population: a prevalence study. *Pharmacoepidemiol Drug Saf* 2002;11:409–414.
7. Lam CL, Catarivas MG, Munro C, Lauder IJ. Self medication among HongKong Chinese. *Soc Sci Med* 1994;39:1641-7.
8. Sanghani S, Zaveri HG, Patel VJ. Self medication: Prevalence & pattern in urban community. *J Pharmacovigilance Drug Safety* 2008;5:95-8.
9. Phalke VD, Phalke DB, Durgawale PM. Self medication practices in rural Maharashtra. *Indian J Community Med* 2006;31:34-5.
10. World Health Organization. WHO Guidelines for the regulatory assessment of medicinal products for use in self-medication. *WHO drug information* 2000;14(1):18-26.
11. Kalyan VS, Sudhakar K, Srinivas P, Sudhakar G, Pratap K, Padma TM. Evaluation of self-medication practices among undergraduate dental students of tertiary care teaching dental hospital in South India. *J Educ Ethics Dent* 2013;3:21-5.
12. Wajantri P, Angadi MM, Masali.KA, Shashank KJ, Sowmya BA. Study on knowledge attitude and practice about self medication among college students. *Int J Health Sci Res* 2013;4(7):2249-9571.
13. Pandya RN, Jhaveri KS, Vyas FI, Patel VJ. Prevalence pattern and perceptions of self-medication in medical students. *Int J Basic Clin Pharmacol* 2010;2(3):275-280.
14. Banerjee I, Bhadury T. Self-medication practice among undergraduate medical students in a tertiary care medical college. *West Bengal J Postgrad Med* 2012;58(2):127–131.
15. Badiger S, Kundapur R, Jain A, Kumar A, Pattanshetty S. Self-medication patterns among medical students in South India. *Australas Med J* 2012;5(4):217–220.

ORIGINAL PAPER

Serum Uric Acid in Hypertension and Cerebrovascular Accident

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ABSTRACT

A case control study was undertaken to evaluate any association of serum uric acid level with hypertension and to study whether serum uric acid level is elevated in cases of cerebrovascular accident or not. A total of 100 subjects were included in this study to assess the possible association of serum uric acid level in diagnosed cases of hypertension and cerebrovascular accident. Among the subjects, 20 cases suffered from essential hypertension, 30 cases were of cerebrovascular accident and 50 subjects served as control group. Serum uric acid level was estimated in all the subjects calorimetrically. The mean serum uric acid levels in control group, hypertension and cerebrovascular accident cases were 3.34 ± 0.46 mg/dl, 4.95 ± 1.38 mg/dl and 5.00 ± 0.83 mg/dl respectively with a significance of $P < 0.001$. It was found to be increased significantly not only in hypertension cases but also in cerebrovascular accident cases. Conclusion: A significant association between high serum uric acid level and hypertension as well as cerebrovascular accident was observed. Thus by estimating the serum uric acid level in diagnosed cases of hypertension we can screen out the patients that may have the chance of developing cerebrovascular accident in future.

Keywords: Hyperuricemia, uricase/PAP method, cerebral hemorrhage, cerebral thrombosis

INTRODUCTION

Hypertension is a common health problem with sometimes devastating consequences and often remains asymptomatic until late in its course. It is one of the most important risk factors for both coronary artery disease and cerebrovascular accidents; hypertension can lead to cardiac hypertrophy and potentially, heart failure, aortic dissection and renal failure. It is widely acknowledged that hypertension is a complex, multifactorial disease that has both genetic and environmental determinants.

Among the etiological factors for cerebrovascular disease, hypertension is the most important one causing mainly atherosclerotic changes with thrombus formation and haemorrhage in the cerebral vessel. In the pathogenesis of cerebrovascular disease in hypertensive patients high blood pressure is not the sole factor to cause the vascular changes but blood biochemistry and metabolites have a definite role. Heyman et al¹, Feldman et al², Katsuki et al³, Jakobson et al⁴ and later John Pearce and Hasan Aziz⁵ had shown that serum lipids were consistently higher in cerebrovascular disease than normal population. Meyer et al⁶ pointed out that cerebral ischemia and infarction

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might occur in the presence of normal serum lipid levels. So there must be other metabolites that may play in the pathogenesis of cerebrovascular disease. Hyperuricemia was first associated with hypertension and cerebrovascular disease in 1879.⁷ Since that time, many have attributed this association to a simple clustering of hyperuricemia with well established cardiovascular risk factors, and an elevated serum uric acid level by itself has generally been regarded as insignificant or incidental. Breckenridge A (1966)⁸ had shown that the incidence of cerebrovascular disease in hypertensive patients with high uric acid level was much more than that of normal uric acid level. Hyperuricemia in hypertension without typical gouty arthritis has been described first by Dollery et al⁹ and subsequently by Pomerantz¹⁰ and Freis.¹¹ In 1965, Kolbet et al also studied the relation of hyperuricemia with hypertension.

Breckenridge has established a definite relation of hyperuricemia with hypertension without gouty arthritis and without taking any antihypertensive drugs. He also pointed out that there is no tendency for hyperuricemia to occur only in patient with more severe degree of hypertension.¹² Again the incidence of cerebrovascular disease is high in hypertensive patients with high uric acid level than normal uric acid level. John Pearce and Hasan Aziz also studied the prevalence of hyperuricemia with cerebrovascular disease.

The aim of the study was to evaluate any association of serum uric acid level with hypertension irrespective of degree of hypertension and the use of antihypertensive drugs and to study whether serum uric acid level is elevated in cases of cerebrovascular accident or not.

MATERIALS AND METHODS

The present study was designed as a case control hospital based study in tertiary care medical college and hospital. Three groups of subjects selected for the study are as follows:

(i) **Control group:** In the control group only those subjects were selected who gave no history suggestive of hypertension or any major illness in the recent past and in whom clinical examination did not reveal any abnormality relating to the system. Fifty numbers of male (31) & female (19) age and sex matched healthy controls were included in this study that co-operated voluntarily.

(ii) **Test group:** In test group 20 subjects (male-13 &

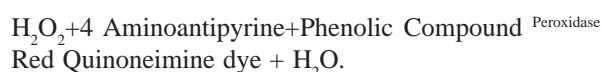
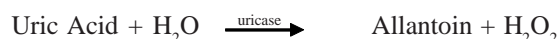
female-7) suffering from hypertension and another 30 subjects (male-18 & female-12) of cerebrovascular accidents cases were selected.

SELECTION OF CASES

1. The criterias for accepting patients as hypertensive are to be persistent elevation of systolic pressure 140-159 mm Hg and or above it and diastolic pressure 90-99 mm Hg and or above it in adults (JNC VII classification).¹³
2. Patients complaining of weakness or paralysis of sudden or gradual onset with or without loss of consciousness having upper motor neuron type of lesion and suggestive of cerebrovascular accidents regardless of age or severity of neurological deficit were selected for the present study.
3. General physical and complete neurological examinations were carried out with the physician at the time of admission. The type of stroke was diagnosed and confirmed by CT scan of brain.
4. Cases having renal disease, liver disease, myocardial infarction and definite history of gout were carefully excluded from the study. Patients complaining of weakness or paralysis with or without loss of consciousness suggestive of traumatic intracranial vascular accidents were excluded from the study.
5. 5 ml of blood sample was collected from each subject irrespective of the fasting state using a sterilized syringe into clotted vials. The samples were then allowed to stand for some time and then centrifuged for separation of sera. This serum was then used for estimation of serum uric acid.

Analysis of uric acid was done using the kit of Crest Bio systems. Serum uric acid was estimated by Uricase / PAP Method.^{14, 15}

Principle: Uricase converts uric acid to allantoin and hydrogen peroxide. The hydrogen peroxide formed further reacts with a phenolic compound and 4 aminoantipyrine by the catalytic action of peroxidase to form a red coloured quinoneimine dye complex. Intensity of the colour formed is directly proportional to the amount of uric acid present in the sample, which is measured at 520 nm.



STATISTICAL ANALYSIS

The values of the measured parameter were grouped and tabulated. The data was expressed as mean \pm standard deviation. The student t test was used for evaluation of the significance of differences in means of different groups. The mean serum uric acid level in control group, hypertension and cerebrovascular accident cases were 3.34 ± 0.46 mg/dl, 4.95 ± 1.38 mg/dl and 5.00 ± 0.83 mg/dl respectively with a significance of $P < 0.001$.

RESULT AND OBSERVATION

Our study population comprised of a total of 100 subjects. Among them 50 healthy controls designated as group A, 20 patients suffered from hypertension (designated as cases, group B) and 30 patients were of cerebrovascular accident (designated as cases, group C). Serum uric acid levels were significantly elevated in patients of both groups, B and C when compared to that of group- A. The results are shown in **Table 1**, **Table 2**, **Table 3** and **Table 4**.

The serum uric acid levels in 50 healthy control cases were found to be ranged from 2.5 to 4.8 mg% with the mean level being 3.34 ± 0.46 mg%. The serum uric acid was highest (3.90 ± 0.57 mg%) in the 7th decade of life and it is higher in case of male than female. In the hypertensive group the mean value is 4.95 ± 1.38 mg% with the range of 2.9-7.8 mg%. High uric acid level was not correlated with the duration of hypertension but depends on the degree of severity of hypertension. In 30 cases of cerebrovascular accident, the mean value is 5.00 ± 0.83 mg% with the range 3.4-6.2 mg% ($P < .001$). In the haemorrhagic group the mean value is 5.24 ± 0.78 mg% with the range 3.8-6.2 mg% ($P < .001$) and in the ischaemic group the mean value is 4.89 ± 0.87 mg% with the range 3.4-6.0 mg % ($P < .001$). The incidence of cerebrovascular accident was found to be significantly greater in those hypertensive patients who had a raised serum uric acid level.

Table 1 Showing the distribution of severity of hypertension in relation to age (After JNC VII Report)

Age group (Yrs)	Prehypertension Systolic BP =120-139 mm Hg Diastolic BP=80-90 mm Hg	Stage-I hypertension Systolic BP =140-159 mm Hg Diastolic BP=90-99 mm Hg	Stage-II hypertension Systolic BP = \geq 160 mm Hg Diastolic BP= \geq 100 mm Hg
Up to 40	2	1	-
40 - <50	5	1	-
50 - <60	3	2	1
60 - <70	2	-	-
70 - <80	-	2	1
80 e''	-	-	-
Total	12 (60%)	6 (30%)	2 (10%)

Table 1 Shows that out of 20 hypertensive patients 12 (60%) were in prehypertension group, 6 (30%) were in

Stage-I hypertension and 2 (10%) were in Stage-II hypertension. Prehypertensive were found in the age group 32 to 69, Stage-I were found in between 28 to 70 years and Stage-II hypertensive patients were found in between 50 to 80 years of age.

Table 2 Number of cases with percentage in major types of cerebrovascular accident (CVA)

Type of CVA	No of cases	Percentage
Hemorrhagic stroke	10	33.33
Ischemic stroke	20	66.67
Total	30	100

Table-2 shows that out of 30 cases of CVA 10(33.33%) cases were Haemorrhagic stroke and 20 (66.67%) cases were Ischaemic stroke.

Table 3 Showing serum uric acid level in different study group

STUDY GROUPS	NOS	MEAN	SD
Hypertension	20	4.95	1.38
CVA	30	5.00	0.83
Control	50	3.34	0.46

Table 4 Statistical analysis and their significance of the result of serum uric acid in study groups

Groups	Degrees of freedom	Serum Uric Acid		
		't'	'p'	Significance
Control Vs Hypertension	68	7.38	<0.001	Very highly significance
Control Vs CVA	78	11.59	<0.001	Very highly significance
Control Vs Haemorrhagic Stroke	58	10.55	<0.001	Very highly significance
Control Vs Ischaemic Stroke	68	9.76	<0.001	Very highly significance

DISCUSSION

This study shows that, serum uric acid levels in both hypertension and cerebrovascular accident cases have a significantly higher value compared to control subjects ($P < 0.001$). High blood pressure is one of the most common chronic health problems in our society. Most of the patients with pre hypertension and Stage-I hypertension group and indeed some with dangerously high levels are asymptomatic and are diagnosed accidentally in the course of a routine physical examination. Symptoms occur in asymptomatic patients when the target organs are affected. It constitutes one of the major causes of disability and death.

Various investigations have been done to evaluate the aetiological aspects of hypertension and cerebrovascular disease but the exact cause is still obscure. Multiple interrelated factors have been shown to play a role in the evolution of hypertension and cerebrovascular disease. Hyperuricemia is one of them, the incidence of cerebrovascular disease in hypertensive patients with high uric acid level is much more than that of normal uric acid level. (Breckenridge, A 1966).⁸

In the field of serum uric acid studies many workers has observed high serum uric acid level in hypertensive groups of patients irrespective of getting antihypertensive drugs. Kinsey D et al¹⁶ studied 400 patients with hypertensive disease and found that more than 40 percent (183 out of 400) of all the cases had high serum uric acid level. The incidence of hyperuricaemia is more in case of men (52%) than in women (43%) and there is no correlation between kidney functions and hyperuricaemia unless the blood urea was over 30mg%. Moreover, the hyperuricaemia is significantly higher with severe hypertension compared to the more benign hypertension.

In the present study, the mean value of serum uric acid in hypertensive cases was 4.95 ± 1.38 mg% with a range 2.9 to 7.8 mg%. Out of 20 cases 9 (45%) showed high uric acid level irrespective of degree of hypertension. The elevation of serum uric acid in cases of hypertension was found to be significant compared to the controls on statistical analysis ($P < .001$).

In the cerebrovascular accident group out of 30 cases, hyperuricaemia occurs in 19 cases (63.33%) and normal uric acid level in 11 cases (36.67%). In thrombosis group 11 (55%) out of 20 had high uric acid level, in haemorrhagic group 8 (80%) out of 10 had high uric acid level. These results correlate with the observation done by Breckenridge A.⁸

The mean value of serum uric acid in cerebrovascular accident was found to be 5.00 ± 0.83 mg% with a range of 3.4-6.2 mg%. In thrombosis groups the mean value of serum uric acid was found to be 4.89 ± 0.87 with a range of 3.4-6.0 mg% and in the haemorrhagic group the range was 3.8 to 6.2 mg% with the mean value of 5.24 ± 0.78 mg%. The elevation of serum uric acid level in cerebrovascular accident was found to be significant compared to the controls on statistical analysis ($P < .001$).

The result of the present study shows that a significant portion of patients with cerebral infarction or cerebral haemorrhage showed high uric acid level. This approximately correlates with Hansen (1965)¹⁷, Meyer et al¹⁸, Pearce J et al¹⁹ and correlates exactly with Breckenridge A.⁸ It seems therefore that hyperuricaemia in the absence of gout or any other known predisposing cause is present in a significant portion of patients with sustained hypertension and with cerebral infarction or cerebral haemorrhage.¹⁹

CONCLUSION

From this study, it is found that hypertension may raise the serum uric acid level by overproduction or under excretion of the same. On the other hand high blood pressure acts as a major risk factor in the occurrence of cerebrovascular accident and uric acid levels were found to be high in this group of cerebrovascular accident. Therefore we came to the conclusion that high uric acid has a definite role in hypertension as well as in cerebrovascular accident and thus by estimating the uric acid level in hypertensive patients, we can screen out the patients that may have the chance of developing cerebrovascular accident in future. But due to some practical difficulties and time limitation, it was not possible

to find out the exact mechanism of uric acid in genesis of hypertension and cerebrovascular accident.

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Conflict of interest: None declared.

Ethical clearance: Taken.

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REFERENCES

1. Heyman A, Nefzger MD, Estes EH. Serum cholesterol level in cerebral infarction. *Arch Neurol* 1961 Sep;5:264–268.
2. Feldman RG, Albrink MJ. Serum lipid and cerebrovascular disease. *Arch Neurol* 1964;10:91-100.
3. Katsuki S, Uzawa H, Fujimi S, Shiratsuchi K, Ito Y. Studies on blood lipids in cases with cerebrovascular diseases- a preliminary report. *Jpn Heart J* 1964 Mar;5:101–107.
4. Jakobson T. Glucose tolerance and serum lipid levels in patients with cerebrovascular disease. *Acta Medica Scandinavica* 1967 Jan/Dec;182(2):233-243.
5. Pearce J, Hasan Aziz. Uric acid and plasma lipids in cerebrovascular disease part-II. Uric acid and plasma lipids correlations. *J Neurol Neurosurg Psychiat* 1970;33:88-91.
6. Meyer JS, Waltz AG, Hess JW, Zak B. Cholesterol levels in cerebrovascular disease. *A M A Arch Neurol* 1959;1:303-311.
7. Mahomed FA. On chronic Bright's disease, and its essential symptoms. *The Lancet* 1879;1:399-401.
8. Breckenridge A. Hypertension and hyperuricemia *The Lancet* 1966 Jan;1:15-18.
9. Dollery CT, Duncan H, Schumer B. Hyperuricaemia related to treatment of hypertension. *Br Med J* 1960;11:832.
10. Pomerantz HZ. Coronary artery disease in the young, an analysis of 162 cases. *C M A J* 1960;82:842.
11. Freis ED. Double blind control study of antihypertensive agents. *Arch Intern Med* 1962;110:230.
12. Cannon PJ, Stason WB, Demartini FE, Sommers SC, Laragh JH. Treatment for cardiovascular disease. *Ann Int Med* 1965;62:667-74.
13. Chobanian AV, Bakris GL, Black HR. The seventh report of the Joint National Committee on prevention, detection, evaluation and treatment of high blood pressure: JNC 7 Report. express version. *JAMA* 2003;289:2560-2572 Complete version: *Hypertension* 2003;42:1206-1252.
14. Trinder P. Chromogenic system for measuring hydrogen peroxide: the enzymatic uric acid assay. *Ann Clin Biochem* 1969;6:24.
15. Fossati P, Prencipe L. Chromogenic system for measuring hydrogen peroxide: the enzymatic uric acid assay. *Clin. Chem* 1980;26:227.
16. Kinsey D, Walther R, Herbert S, WhiteLow G, Smithwick R. Hyperuricemia in primary and renal hypertension. Boston Massachusetts 1961 *Circulation*;24:972.
17. Hansen OE. Hyperuricemia in cerebral infarction. *Acta Neurologica Scandinevica* 1965;41:357.
18. Meyer JS, Kypros GP, Gilroy J. Uric acid and plasma lipids in cerebrovascular disease. *W V Med J* 1964;60:150.
19. Pearce J, Hason Aziz. Uric acid and plasma lipids in cerebrovascular disease, Part-I Prevalence of Hyperuricemia. *Br Med J* 1969;4:78-80.

ORIGINAL PAPER

Endoscopic Management of Foreign Bodies in the Airways and Esophagus of Children

Goswami Jayanta Kr¹

Received on September 15, 2015; editorial approval on December 8, 2015

ABSTRACT

Foreign body in the esophagus and airway in children is an important cause of morbidity and mortality. The aim of this study is to summarize the experience of diagnosis and treatment of tracheobronchial and esophageal foreign bodies in children. The medical records of 15 such cases admitted in Pediatric Surgery Department, Gauhati Medical College, Guwahati from June 2008 to May 2015 were analyzed. Amongst these 15 children, 9 were with airway and 6 with esophageal foreign bodies. Out of these 12 were boys (80%) and 3 girls (20%). Direct laryngoscopy, 3 by rigid esophagoscopy and 1 by flexible endoscopy removed two esophageal foreign bodies. All the 9 airway foreign bodies were removed by rigid bronchoscopy with the help of optical forceps. Seven of these were in the right bronchus and one each in the left bronchus and carina. Two patients needed ventilation after the procedure. The most common foreign body in the esophagus was coin and that of airway was peanut. There were variable period morbidities but all of these fifteen patients went home without any residual effect.

Timely diagnosis and management of foreign bodies in children is utmost important and this can reduce the complications and mortality related to it.

Keywords: Foreign body bronchus, foreign body esophagus, foreign body in children

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INTRODUCTION

The child's instinct to explore the surrounding and their experimentation with the various objects are the main causes of foreign body (FB) lodgment in the esophagus and in the airway in them. Accident often contributes to it. Unless managed urgently most of these cases, especially those with airway FB may turn serious and even may cause death. Though nonsurgical endoscopic removal of these FBs is an established procedure, some patients may require open procedure as well. Here, we are presenting our seven-year experience of management of foreign bodies from the pharynx, esophagus and tracheobronchial tree with the help of endoscopes.

MATERIAL AND METHODS

This is a retrospective analysis of the patients treated in a tertiary centre. The duration was seven years from June, 2008 to May, 2015. Age and sex incidence, time of presentation, presenting signs and symptoms, site of retrieval of FB, instrument and accessories used and post procedure outcome were recorded. All the cases came with the plain x-ray of the chest. General anesthesia was employed in all the cases. Rigid ventilating bronchoscopes (Richard Wolf) of appropriate size (2.5-6mm), with optical forceps and rod lens telescopes were used for FB in the airways. Direct laryngoscopy and Magill's forceps removed two pharyngeal FBs. For one esophageal FB 9 mm Fuginon fiber optic flexible esophago-gastroscope with basket was used. In two cases of coin (**Figure 1**) and one of headless open safety pin (**Figure 2**) in the esophagus rigid esophagoscope and Maryland forceps meant for laparoscopy was used.

One FB could not be removed because of technical difficulty and was managed in other department by thoracotomy and bronchotomy. This case is excluded from our series.

All the cases were admitted for variable period and were followed up in the outpatient department after their discharge.

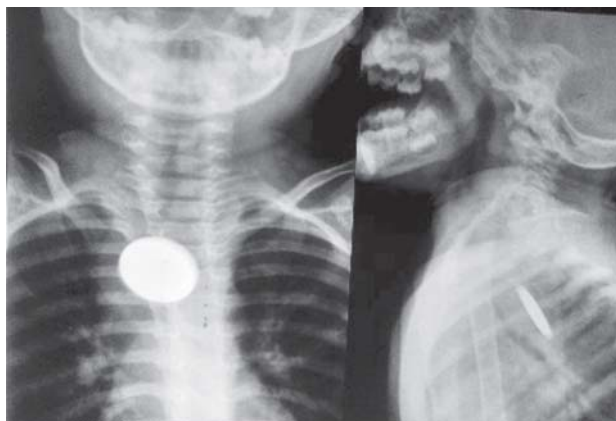


Figure 1 Coin in the upper esophagus



Figure 2 Open safety pin in esophagus

RESULTS AND OBSERVATIONS

SITE OF LODGMENT

Site of lodgment of FB was as follows (**Figure 3**):

Out of the fifteen FBs six were lodged in the esophagus.

Out of these six, three viz. two coins and one headless safety pin were in the upper esophagus and rest three viz. two coins and one locket was found in the lower esophagus.

In the airway seven foreign bodies were in the right bronchus (77.78%), one each in the left bronchus (11.11%) and carina (11.11%).

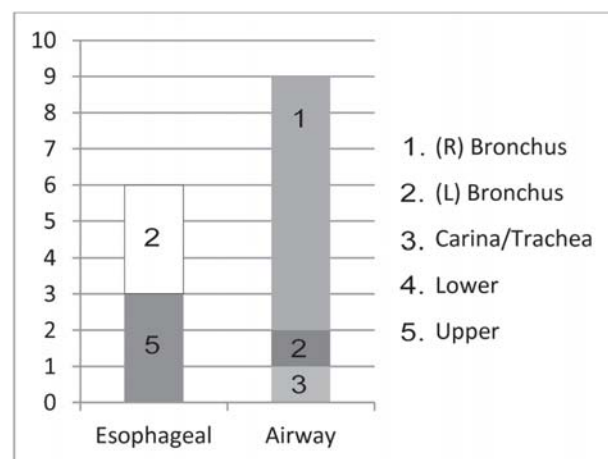


Figure 3 Bar chart depicting site of lodgment of foreign bodies

AGE DISTRIBUTION

The age ranged from 6 months to 7 years. Median age was 3 years. Highest number of cases recorded from 2 to 4 years of age (**Table 1**).

Table 1 Age wise distribution of cases

Age	FB in esophagus	FB in airway	Total	Percentage
6m to 1 yr	0	1	1	6.67%
1yr+ to 2 yr	0	3	3	20%
2yr+ to 3 yr	2	2	4	26.67%
3yr+ to 4 Yr	3	1	4	26.67%
4yr+ to 7 yr	1	2	3	20%
Total	6	9	15	100%

SEX DISTRIBUTION

As shown in **Table 2** male child were more in number. In esophageal FB except a case with coin, all were male child.

Table 2 Sex wise distribution of cases

Sex	No of Patients	Percentage
Male	12	80%
Female	3	20%

CLINICAL PRESENTATION

All the case except three presented as acute emergency. A patient with a broken pin of a mobile charger presented after one month and LED bulb after 3 months. Both the FBs were in the right main bronchus. A patient with coin in the esophagus came after nine days of occurrence.

All the patients with airway FBs had respiratory difficulties and those of esophageal FBs had salivation and difficulty in swallowing. A patient with whistle in the right bronchus presented with whistling sound on deep breathing or in crying. One patient with severe respiratory distress and bradycardia was taken directly to operation theater and was managed as dire emergency. The presenting features are shown in **Table 3**.

Table 3 Clinical presentations

History, symptoms and signs	No. of patients	Esophageal (n=6)	Percentage	Airway (n=9)	Percentage	Total percentage
Positive history	13	6	100%	7	77.78%	86.67%
Salivation	3	3	50%	0	0%	20%
Difficulty in swallowing	7	6	100%	1	11.11%	46.67%
Difficulty in breathing	8	0	0%	8	88.89%	53.33%
Wheeze	7	0	0%	7	77.78%	46.67%
Whistling sound	1	0	0%	1	11.11%	6.67%

INVESTIGATIONS

All the patients presented with plain x-rays of the chest. Metallic FBs were obvious in the film. The glass part of LED bulb FB was radiolucent. But inner metallic part could be seen clearly. Out of the six patients with organic FBs in the airway one had collapse of right lung and pneumothorax. In two other patients x-ray hyperinflation of the affected lung was found. But none of these cases showed FBs.

This case with LED bulb and the charger pin came with CT scans at their presentation.

REMOVAL

Two coins lodged in upper esophagus were removed by direct laryngoscopy and with Magill's forceps. Two coins in the mid esophagus needed rigid esophagoscopy and removal with rigid forceps. A locket in the mid esophagus was removed by flexible esophago-gastroscope with a wire basket used through its instrument channel. In a patient where FB was a broken open safety pin needed special maneuver. Holding the spring with the forceps the pin was rotated first to 180°, and then it was pulled partially inside the rigid scope. Lastly scope and FB was removed together (**Figure 4**).

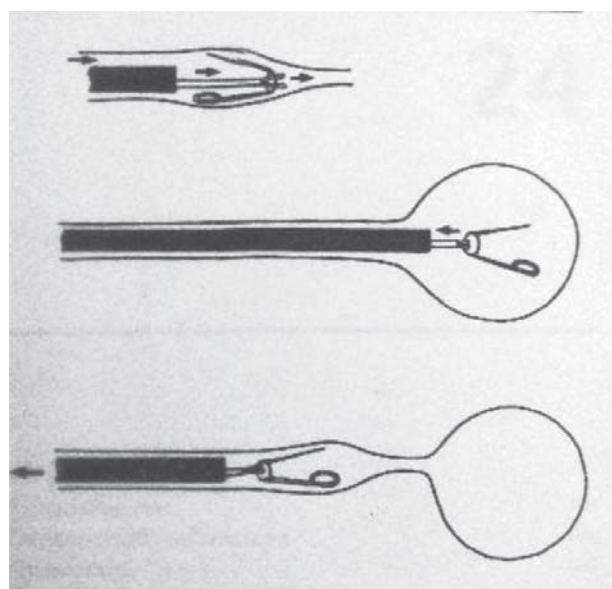


Figure 4 Schematic diagram of method of removal of open safety pin

Airway FBs were removed by rigid ventilating bronchoscope aided by optical foreign body forceps. One FB (LED bulb) during its removal dislodged from the forceps after passing the larynx and was retrieved from the pharynx by a Magill's forceps.

FOREIGN BODIES

Various FBs encountered and their sites of lodgment are tabled in **Table 4**. In the esophageal FB coin and in the airway peanut were commonly encountered. **Figure 5** shows some of the FBs removed.

Table 4 Foreign bodies removed

Foreign body	Site	Number
Coin	Esophagus	4
Locket (Cross)	Esophagus	1
Open safety pin	Esophagus	1
LED bulb	R-Bronchus	1
Broken Charger pin	R-Bronchus	1
Pea nut	R-Bronchus	3
Gram seed	L-Bronchus	1
Whistle	R-Bronchus	1
Chicken bone	R- Bronchus	1
Tamarind seed	Carina	1

**Figure 5** Some of the foreign bodies removed

RECOVERY AND HOSPITAL STAY

Two patients with upper esophageal FBs were allowed feeding after few hours of procedure and were discharged on the same day. Others were observed till next morning and feeding was started thereafter.

Seven out of nine airway FBs required post procedure oxygen supplementation by hood or by mask for few hours. Feeding was started in these cases gradually once their respiratory distress settled down. All these patients were discharged within 36 hours.

Two patients with airway FB required ventilation. One with peanut developed a right sided pneumothorax and surgical emphysema and was managed by insertion of a water seal intercostals drain. This patient was ventilated for 48 hours. Surgical emphysema disappeared spontaneously gradually. Patient was discharged on 6th postoperative day. Other patient with gram seed required 24 hours ventilation and was discharged after 4 days.

DISCUSSION

Open safety pin in pharynx and esophagus had been reported by several authors.^{1,2,3} In most of the cases these were removed endoscopically. Passey JC et al.³ reported a case of open safety pin in the esophagus, which caused perforation of common carotid artery. In our case of safety pin the head was missing and both the arms had sharp ends. In our literature search we have not found any such case.

Coin is the commonly encountered FB in the esophagus. In most of the centers it is removed with endoscopes. In early cases the procedure can be performed safely.^{4,5} Foley's balloon catheter with radiologic guidance is used in some centers where endoscopes are not available.⁶

In United States out of all accident related deaths in children below 4 years of age, 5% are due to FB aspiration.⁷

Toddler and young children because of their insufficient dentition often inhale the partially chewed foods.⁸ Gulati SP et al⁹ opined that pea nut is the commonest tracheobronchial FB encountered in India. In our series also amongst the airway FBs peanut was in the top of the list. Dyspnoea and bronchial reation is common in FB of vegetable origin.¹⁰ In the present series also one patient with peanut presented with severe respiratory distress. Other patients with vegetable FB also had moderate respiratory distresses.

In most of the series male cases outnumbered the female.^{11,12} In our series 12 patients(80%) were male and 3 (20%) were female.

In airway FB right bronchus was the commonest site in all the series. Fraga et al¹⁰ had 7 in right and 4 in left bronchus. While in the series of Tariq P¹³ right and left ratio was 1.4:1. Gang W et al¹⁴ in a mega series of 953 cases found 98 FB in the trachea or on both sides, 506 in the right bronchus and 349 in the left bronchus. In our series 5 were in the right and 1 was in the left bronchus. One FB was in the carina region.

According to Evans JNG¹⁵ the wider and more downward direction of right bronchus is the cause of predominance of right side.

CONCLUSION

Airway foreign body is often life threatening condition. Its removal requires skilled person and tertiary centre care. On the other hand smooth esophageal foreign bodies can be removed easily in the peripheral hospitals, if the technique is learnt properly.

Conflict of interest: None declared.

Ethical clearance: Taken.

Source of funding: None declared.

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REFERENCES

1. Kalayci A, Tander B, Kocak S, Rizalar R, Bernay F. Removal of open safety pins in infants by flexible endoscopy is effective and safe. *J Laparoendosc Adv Surg Tech A*. 2007 Apr;17(2):242-5. PMID: 17484658
2. Sarihan H, Kaklikkaya I, Ozcan F. Pediatric safety pin ingestion. *J Cardiovasc Surg (Torino)*. 1998 Aug;39(4):515-8. PMID: 9788804
3. Passey JC, Meher R, Agarwal S, Gupta B. Unusual complication of ingestion of a foreign body. *J Laryngol Otol*. 2003 Jul;117(7):566-567. PMID: 12901816
4. Tander B, Yazici M, Rizalar R, Ariturk E, Ayyildiz SH, Bernay F. Coin ingestion in children: which size is more risky? *J Laparoendosc Adv Surg Tech A*. 2009 Apr;19(2):241-3. PMID: 19215216
5. Pokharel R, Adhikari P, Bhusal CL, Guragain RP. Oesophageal foreign bodies in children. *JNMA J Nepal Med Assoc*. 2008 Oct-Dec;47(172):186-8. PubMed: 19079391
6. Bowa K, Bvulani B, Mukonge L. The use of Foley's catheter in the removal of a coin in the oesophagus. *Trop Doct*. 2009 Apr;39(2):97-8. PMID: 1929929
7. Rovin JD, Rodgers BM. Pediatric foreign body aspiration. *Pediatr Rev*. 2000 Mar;21(3):86-90. PubMed PMID: 10702322
8. Hayes NM, Chidekel A. Pediatric choking. *Del Med J*. 2004 Sep;76(9):335-40. PMID:15510972
9. Gulati SP, Kumar A, Sachdeva A, Arora S. Indian J Med Sci. Groundnut as the commonest foreign body of tracheobronchial tree in winter in Northern India. An analysis of fourteen cases. 2003 Jun;57(6):244-8. PMID:14510341
10. Fraga Ade M, Reis MC, Zambon MP, Toro IC, Ribeiro JD, Baracat EC. Foreign body aspiration in children: clinical aspects, radiological aspects and bronchoscopic treatment. *J Bras Pneumol*. 2008 Feb;34(2):74-82. PMID: 18345450
11. Kaur K, Sonkhya N, Bapna AS. Foreign bodies in the tracheobronchial tree: A prospective study of fifty cases. *Indian J Otolaryngol Head Neck Surg*. 2002 Jan;54(1):30-4. PMID: 23119848
12. Paksu S, Paksu MS, Kilic M, Guner SN, Baysal K, Sancak R, Ozturk F. Foreign body aspiration in childhood: evaluation of diagnostic parameters. *Pediatr Emerg Care*. 2012 Mar;28(3):259-64. PMID: 22344214
13. Tariq P. Foreign body aspiration in children—a persistent problem. *J Pak Med Assoc*. 1999 Feb;49(2):33-6. PMID: 10513434
14. Gang W, Zhengxia P, Hongbo L, Yonggang L, Jiangtao D, Shengde W, Chun W. Diagnosis and treatment of tracheobronchial foreign bodies in 1024 children. *J Pediatr Surg*. 2012 Nov;47(11):2004-10. PMID: 23163990
15. Evans JNG. Foreign bodies in the larynx and trachea. In: Kerr AG, editor. *Scott Brown's Otolaryngology*, 5th edn. London: Butterworth; 1987. P. 288-91.

ORIGINAL PAPER

Morphological Study of Human Spleen in Different Age Groups

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ABSTRACT

Spleen is the largest lymphoid organ. It is a haemo-lymphatic organ containing large amount of lymphatic tissues and plays a vital role in metabolism and defence mechanism of body. It is the largest lymphoid organ and its size varies with individuals' age, sex and underlying metabolic conditions. Spleen takes an important part in body immunity, as high incidences of serious bacterial infections were reported following splenectomy in infancy. A research work was carried out in the department of Anatomy, Gauhati Medical College. The morphological characteristics of 21 normal human spleens were studied in different age groups and to correlate them functionally. The specimen of spleen varies from newborn to eighty year old cadavers, within stipulated time limit after fulfilling the formalities. The spleens were first washed in normal saline, dried with blotting paper, weight was taken by electronic weighing machine and dimensions are measured by vernier calliper. The dimensions and weight were measured and statistically analysed. The recorded data were then statistically analysed using Student's T-test. P value 0.05 is considered as statistically significant. The data obtained in this study will help in certain medico-legal practices. This study may be used as a pedestal for further sophisticated studies.

Keywords: Human spleen, length, breath, thickness, weight

INTRODUCTION

Spleen is a haemo-lymphatic organ containing large amount of lymphatic tissues and plays a vital role in metabolism and defence mechanism of body. It is the largest lymphoid organ and its size varies with individuals' age, sex and underlying metabolic conditions. The spleen is 12-15 cm long and 5-8 cm wide.¹ The spleen varies in shape from that of a slightly curved wedge (when the colic impression is small) to a tetrahedron (When the colic impression is large). In the adults, the spleen is usually about 12 cm in length, 7 cm in breadth and 3-4 cm in thickness and its average weight is about 150 gm. It is larger in well fed animals but is smaller in starved animals.² The weight of spleen gradually declines in man, with a slight presenile increase at approximately 40-50 years of age.³ The growth of lymphoid tissues (e.g.-thymus, spleen and pharyngeal tonsils) reaches its peak by about six to seven years which is nearly double of that seen in adult. Thereafter it regresses gradually upto puberty.⁴ The weight of the spleen varies significantly; it is less in women than in men of corresponding age, the spleen reaches its maximum size in second decade of life than gradually involutes. The normal weight of human

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spleen varies from 50-250 gm.⁵ Grossly the spleen may appear in a variety of shapes. It may be wedge shaped-44%, tetrahedral-42% or triangular-14% depending on its relationship with neighbouring organs during development.^{6,7} At birth, the spleen weighs approximately 11gm. Thereafter it enlarges until puberty, reaching an average weight of 135 gm, before diminishing in size during adulthood.⁸ The shape of spleen varies from a slightly curved wedge to a domed tetrahedron. The shape is mostly determined by its relations to neighbouring structures during development. The size and weight of spleen vary with age and sex.⁹

OBJECTIVES

- To see the morphological changes of length, breadth & thickness of human spleen in different period of life.
- To see the morphological changes of weight of human spleen in different ages.

MATERIALS AND METHODS

Collection of specimen:

- From the department of Forensic Medicine, Gauhati Medical College, Guwahati, from the cadavers within stipulated time limit after fulfilling the formalities. Care was taken to collect the non-pathological specimens.
- From the cases of neonatal deaths in the department of Obstetrics and gynaecology,

Method of weighing and measurement:

Spleens were first washed in normal saline, dried with blotting paper and weighed in an electronic weighing machine. The length, breadth, and thickness were measured by means of graph paper, scale, pin to locate the maximum length/breadth and vernier calliper mainly for thickness measured at the level of hilum of spleen.

Analysis:

The data recorded was analysed statistically using Student's T-test. *P* value 0.05 is considered as statistically significant

OBSERVATION & RESULTS

The results and observations of the present study is tabulated and graphed as follows:

Table 1 Average length, breadth & thickness of human spleen

Age group	Average value in cm		
	Length	Breadth	Thickness
Paediatric group (0 to 14 years)	4.41	4.13	1.99
Adult group (15 to 50 years)	12.05	7.13	3.34
Geriatric group (More than 50 years)	9.46	6.93	3.09
SUM	25.92	18.19	8.42

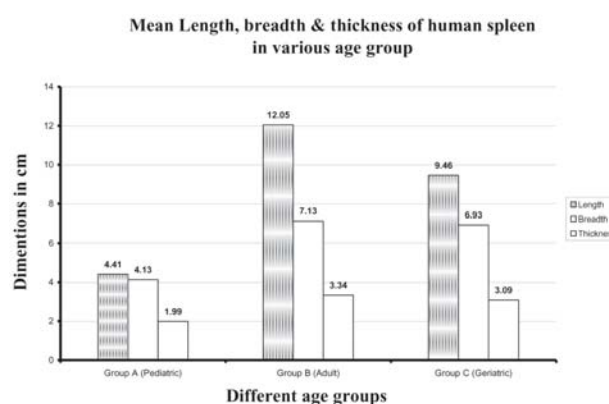


Figure 1 Mean value of different parameters

Table 2 Mean length of spleen in different age group

Class interval of different age group	Length		
	f (frequency)	fr (relative frequency)	f% (percentage)
Pediatric	4.414	0.171	17.100
Adult	12.057	0.465	46.500
Geriatric	9.457	0.364	36.400
SUM	25.928	1.000	100.000

In **table 2** for mean length of the spleen the highest relative frequency 0.465 is seen in the 'adult age group' with a simple frequency of 12.057 and percentage of 46.500 and the lowest relative frequency 0.171 is seen in the 'pediatric age group' with a simple frequency of 4.414 and percentage of 17.100 which is evident in **Figure 2**

Table 3 Mean Breadth of spleen in different age group

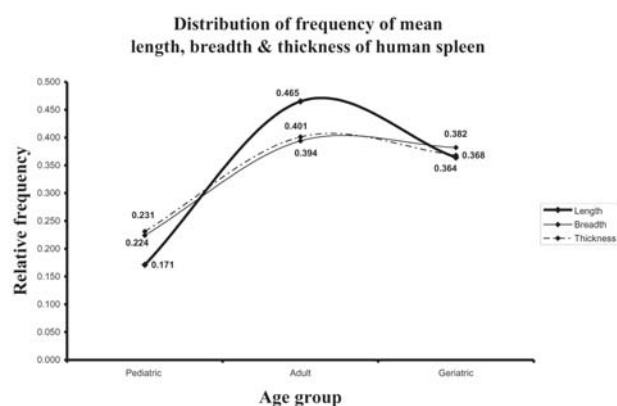
Class interval of different age group	Breadth		
	f (frequency)	fr (relative frequency)	f% (percentage)
Pediatric	4.057	0.224	22.400
Adult	7.129	0.394	39.400
Geriatric	6.886	0.382	38.200
SUM	18.072	1.000	100.000

In **table 3** for mean breadth of the spleen the highest relative frequency 0.394 is seen in the 'adult age group' with a simple frequency of 7.129 and percentage of 39.400 and the lowest relative frequency 0.224 is seen in the 'pediatric age group' with a simple frequency of 4.057 and percentage of 22.400 which is evident in **figure 2**.

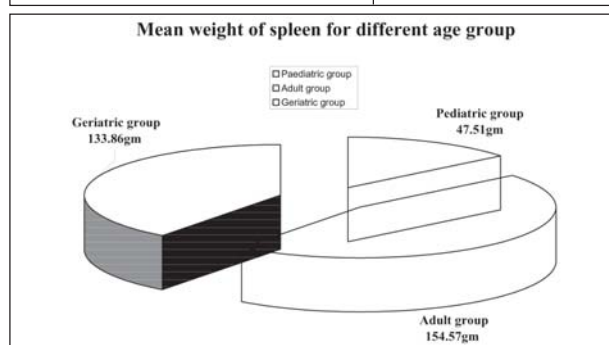
Table 4 Mean thickness of spleen in different age group

Class interval of different age group	Thickness		
	f (frequency)	fr (relative frequency)	f% (percentage)
Pediatric	1.929	0.231	23.100
Adult	3.371	0.401	40.100
Geriatric	3.086	0.368	36.800
SUM	8.386	1.000	100.000

In **table 4** for mean thickness of the spleen the highest relative frequency 0.401 is seen in the 'adult age group' with a simple frequency of 3.371 and percentage of 40.100 and the lowest relative frequency 0.231 is seen in the 'pediatric age group' with a simple frequency of 1.929 and percentage of 23.100 which is evident in **figure 2**.

**Figure 2** Distribution of relative frequency**Table 5** Average weight of human spleen

Age group	Average weight in gm
Paediatric group (0 to 14 years)	47.51
Adult group (15 to 50 years)	154.57
Geriatric group (More than 50 years)	133.86
SUM	335.94

**Figure 3** Mean weight of spleen**Table 6** Mean weight of spleen in different age group

Class interval of different age group	Weight		
	f (frequency)	fr (relative frequency)	f% (percentage)
Pediatric	47.51	0.142	14.200
Adult	154.57	0.460	46.000
Geriatric	133.86	0.398	39.800
SUM	335.94	1.000	100.000

In **table 6** for mean weight of the spleen the highest relative frequency 0.460 is seen in the 'adult age group' with a simple frequency of 154.57 and percentage of 46.000 and the lowest relative frequency 0.142 is seen in the 'pediatric age group' with a simple frequency of 47.51 and percentage of 14.200 which is evident in **figure 4**.

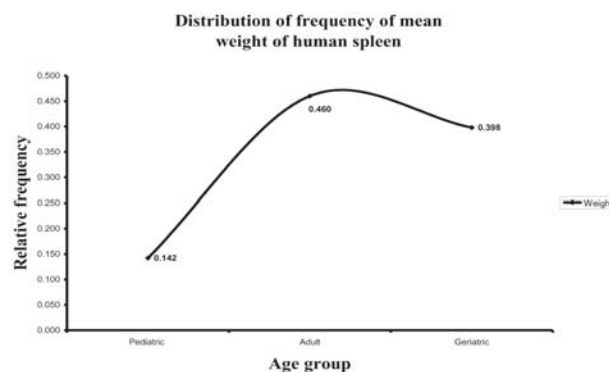
**Figure 4** Distribution of relative frequency

Table 8 Level of significance of differences

Sl. No.	Comparison of mean between	"t"	P
1	Length of spleen in pediatric age group & adult age group	5.595	P<0.01
2	Length of spleen in adult age group & geriatric age group	4.490	P<0.01
3	Breadth of spleen in pediatric age group & adult age group	3.041	P<0.05
4	Breadth of spleen in adult age group & geriatric age group	0.759	P>0.05
5	Thickness of spleen in pediatric age group & adult age group	2.114	P<0.05
6	Thickness of spleen in adult age group & geriatric age group	1.686	P>0.05

DISCUSSION

Studies on length, breadth, thickness & weight of spleen in different age groups have been forwarded many by research workers. Observations suggests that the length, breadth and thickness of spleen reaches its maximum dimensions around puberty and it has quite peculiar growth curve.¹⁰ That spleen reaches its maximum size in second decade of life then gradually involutes.^{11,12} At birth spleen weight 10.7gms.¹³ The growth of the organ follow a peculiar pattern which increases with age reaches the peak around puberty, then involutes.¹⁴ After puberty involution of the organ started and decreases in its weight. The spleen reaches its maximum size in adult life then gradually involutes.¹⁵ Our study is consistent with these universal observation.

Length, breadth, thickness and weight of spleen in different age groups been measured in matched sets of observation using the null hypothesis: Reject H_0 if $P < t_a$ when $t_a = t_{0.05}$ setting the level of confidence at 95% probability signifying that if the differences in observation between the matched groups is significant at the level of $P < 0.05$, the hypothesis will be rejected establishing differences in length, breadth, thickness & weight of spleen between the tested groups.

CONCLUSION

The length, breadth and thickness of spleen in 'adult age group' increases than the 'pediatric age group' with high significance for length ($P < 0.01$) and with significance ($P < 0.05$) for breadth & thickness. Again the length of spleen in 'geriatric age group' decreases than the 'adult age group' with significance ($P < 0.05$), but there is no significant decrease ($P > 0.05$) in breadth and thickness of

spleen in geriatric age group. The weight of the spleen also increases in adult age group highly, and then it decreases minimally in geriatric age group.

Finally, it can be concluded that size of spleen (length, breadth & thickness) and weight increases up to the end of fourth decade of life, then it starts shrinking mainly in length with minimal reduction of weight without much effecting the breadth and thickness.

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Conflict of interest: None declared.

Ethical clearance: Taken.

Source of funding: None declared.

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REFERENCES

1. Thompson JS. Morphology of spleen. Core text book of Anatomy. J. B Lippincott Company. 1977;1(2):307.
2. Ullah M. Histology and Genetics. Theoretical and Applied. Kedarnath Ram Nath Publishers, Meerut. 1978;1:223-249
3. Brocklehurst JC. Spleen. Textbook of Geriatric Medicine and Gerontology. Churchill Livingstone. London and New York. 1978;1:52-53.
4. Gupta S. Function of spleen. A Textbook of Pediatrics. Vikas publishing house Ltd. 1981;2(3)32.
5. Damjanov I and Linder J. Spleen. Anderson's Pathology. 1990;1(10):1201.
6. Morris PJ & Malt RA. Splenic rupture. Oxford textbook of surgery. Oxford Medical Publication. 1994;2(1):34.
7. Lee GR. Wintrobe's Clinical Haematology. Lippincott William and Wilkins. 1999;2(10):1971-1974.
8. Kliegman RM and Benrman RE. "Nelson textbook of Pediatrics". Saunders-An imprint of Elsevier. 2008. p.2089.
9. Standring S. Spleen. "Gray's Anatomy-The Anatomical Basis of Clinical Practice". Churchill Livingstone, Elsevier. 2008;40(2):1191-1194.
10. Kiernander B. Physical medicine in Paediatrics. London Butterworths. 1965;3(1):8.

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| 11. Bosker G. Geriatrics Emergency Medicine. Mosby year book. 1990;2(1):286.
12. Grosfeld JL, O'Neill JA. Paediatric surgery. Mosby publisher. 2006;2(6):1691.
13. Holt LE and Mc. Intosh R. Spleen. Holt Pediatrics. 1953;12(6):687. | 14. Brunicaudi FC, Dana K & Andersen. Schwartz's Principles and Practice of Surgery. Mc Graw-Hill Medical Publishing division. 2005;8:1298.
15. Grant JCB. A method of anatomy- descriptive and deductive. The William and Willkins Company. 1958;54:282. |
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ORIGINAL PAPER

A Study on Gallstone Disease in Relation to Different Ages

Rajbangshi Madhab Chandra¹, Deka Sumi²

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ABSTRACT

Know gallstones and all else will come to you in biliary surgery. This old dictum has been proved today by scientific and clinical means to be largely true. Though the disease had been known from ancient time, the mechanism of formation of gallstones is not yet established and is still a matter of dispute. It is frequently encountered in a woman in her middle age though the incidence is increasing in male sex and in both extreme of age. The old concept that only 'fatty, fertile, flatulent female of forty or fifty' suffers from cholelithiasis, does not always hold true as gallstones can be seen in the extreme of ages in both sexes and thinly built persons as well as in non-fertile female too. Pain is the principal presenting symptom associated with or without flatulent dyspepsia, nausea and vomiting, fever and right upper quadrant tenderness. Radiation / referral of pain showed a peculiar finding that though commonly it refers to the right shoulder. The different ages of gallstone diseases are recorded and statistically analysed. The recorded data were then statistically analysed using Student's T-test. P value < 0.05 is considered as statistically significant. The data obtained in this study will help surgeons for diagnosis of the disease clinically.

Keywords: Gallstone disease, clinical, epidemiological evaluation, ages

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INTRODUCTION

Disease of the gall bladder is rare unless it is associated with gallstone. So the natural history of gallstone is virtually the natural history of gall bladder disease.¹With the exception of acute appendicitis, biliary tract disorders are the commonest abdominal condition that the surgeons, gastroenterologists and radiologists encounter. Benign gall bladder conditions including gallstone disease are increasingly becoming common in developing countries including India.²The old concept that only 'Fatty, Fertile, Flatulent Female of Forty or fifty' suffers from cholelithiasis³, does not always hold true as gallstones can be seen in the extreme of ages in both sexes and thinly built persons as well as in non-fertile female too. Except 10% of patients with gallstones, almost all the others complain of some kind of symptoms like dyspepsia, nausea, vomiting or abdominal pain and sometimes more severe symptoms like right upper quadrant pain, fever, jaundice and lump abdomen may be the presentation. These 10% of cases are termed as asymptomatic gallstones cases, 10% stones are radio-opaque and incidentally detected in radiological examination of abdomen done for other abdominal conditions.⁴ Cholecystectomy is one of the commonest biliary surgeries performed in Medical Colleges in Assam.

OBJECTIVES

- (i) To determine the predominant age of gallstone diseases in males and females and
- (ii) To find out any difference in predominant age of gallstone disease in males and females.

MATERIALS AND METHODS

The study comprises 1300 cases of gallstone disease selected at random who were admitted and operated in the department of surgery of three medical college & hospitals of Assam, two govt. civil hospitals- Kanaklata Civil Hospital, Sonitpur, Dhubri Civil Hospital, Dhubri and Nemcare Hospital Pvt. Ltd. Guwahati, during a period of four years.

Diagnosis: The diagnosis had been made on the basis of symptomatology, ultrasonography and operative findings. The study included the observation of the incidence of age, sex, weight, parity, clinical features, investigations and operative findings, symptom relief during follow up, complications and histopathological reporting of gallstone disease.

Inclusion and exclusion criteria: All cases with clinical sign and symptoms of gallstone disease with pre-operative USG finding of gallstone disease were included. Endoscopic study of upper GIT in clinically suspected peptic ulcer disease with gallstone were also included. Cases with history or investigations suggesting carcinoma of gall bladder were excluded.

OBSERVATION & RESULTS

The results and observations of the present study is tabulated and graphed as follows:

Table 1 Number of cases of gall stone disease

Age in years	Number of cases	
	Male	Female
0 to 20	24	38
21 to 40	272	410
41 to 60	210	253
Above 60	43	50
Sum	549	751
Mean	137.250	187.750
SD	±122.690	±178.001
SEM	±61.345	±89.000

In the present study it is seen that the number of male cases according to different age group ranges from 24 to 273 with a mean value of 137.252, Standard Deviation ±122.690 and Standard Error of Mean ±61.345 and the number of female cases according to different age group ranges from 38 to 410 with a mean value of 187.750, Standard Deviation ±178.001 and Standard Error of Mean ±89.000 as evident in **Table 1** and **Figure 1**

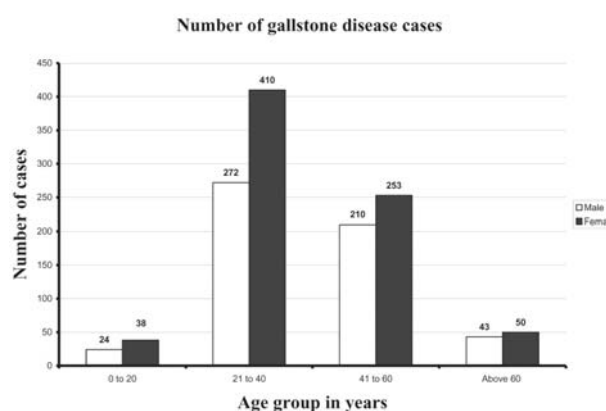


Figure 1 Number of cases in male and female

The percentage of male cases of gallstone disease ranges from 4% to 50% for different age groups as shown in **Figure 2** and the percentage of female cases of gallstone disease for different age group ranges from 5% to 34% as shown in **Figure 3**

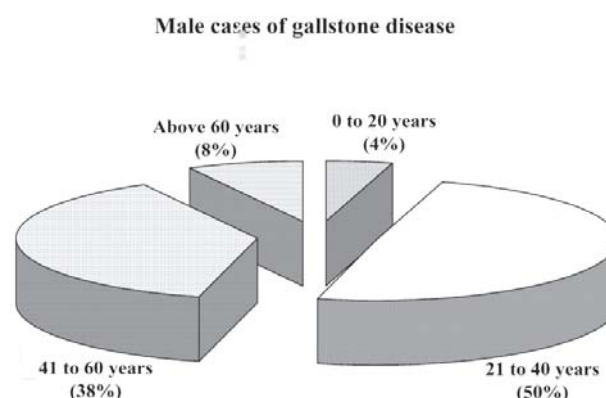


Figure 2 Percentage of male cases

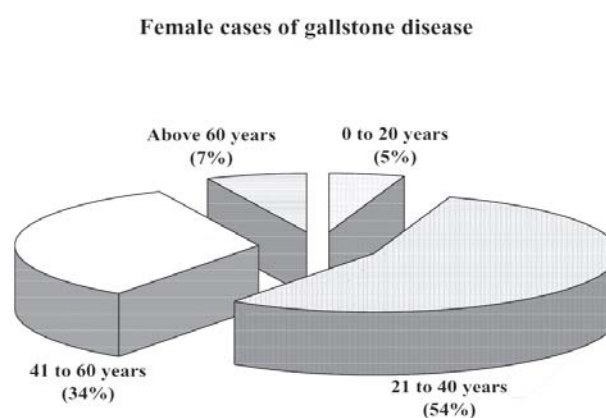


Figure 3 Percentage of female cases

Table 2 Frequency, relative frequency & percentage of gallstones in male

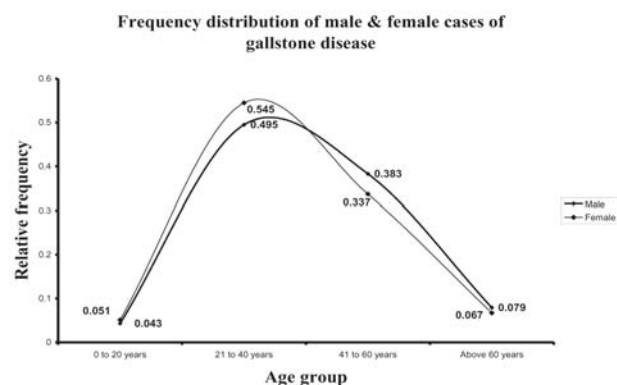
Class interval of age	Male cases		
	f (frequency)	fr (relative frequency)	f% (percentage)
0 to 20 years	24	0.043	4.300
21 to 40 years	272	0.495	49.500
41 to 60 years	210	0.383	38.300
Above 60 years	43	0.079	7.900
Sum	549	1.000	100.000

Table 2 shows that highest number of male cases of gallstone disease are found in the class interval of '21 to 40 years' with a relative frequency of 0.495, simple frequency of 272 and a percentage of 49.500. The lowest number cases are found in the class interval of '0 to 20 years' with a relative frequency of 0.043, simple frequency of 24 and a percentage of 4.300 as evident in **Figure 4**.

Table 3 Frequency, relative frequency & percentage of gallstones in female

Class interval of age	Female cases		
	f (frequency)	fr (relative frequency)	f% (percentage)
0 to 20 years	38	0.051	5.100
21 to 40 years	410	0.545	54.500
41 to 60 years	253	0.337	33.700
Above 60 years	50	0.067	6.700
Sum	751	1.000	100.000

Table 3 shows that highest number of female cases of gallstone disease are found in the class interval of '21 to 40 years' with a relative frequency of 0.545, simple frequency of 410 and a percentage of 54.500. The lowest number cases are found in the class interval of '0 to 20 years' with a relative frequency of 0.051, simple frequency of 38 and a percentage of 5.100 as evident in **Figure 4**.

**Figure 4** Relative frequency

DISCUSSION

In this study the average age of the patients was 40 years. Records from various workers showed that children were rarely affected.^{5, 6, 7, 8} It has been reported that the percentage of positive bile culture ranges between 23-43%.⁹ Positive bile culture increased from age of 40 years and highest percentage of positive culture was recorded in the age group of 81 to 90 years which has a similarity with this study.¹⁰ The disease was also more common in female than male.¹¹ In this study 97.23% cases had the history of pain abdomen during the course of the disease ranging from mild dull-ache to colicky type with or without radiation.¹² There is interscapular radiation in 32.7% of cases and radiation to right scapular region in 30.8% cases.¹³ Maximum cases of gallstones are found in 4th and 5th decade of life.^{14, 15} Our study is mostly consistent with these universal observation.

Gallstone disease in different age groups been seen in matched sets of observation using the null hypothesis: Reject H_0 if $P \leq t_a$ when $t_a = t_{0.05}$ setting the level of confidence at 95% probability signifying that if the differences in observation between the matched groups is significant at the level of $P < 0.05$, the hypothesis will be rejected establishing differences of different age groups of gallstone disease between the tested groups. In the present study null hypothesis has been rejected in the 2nd part while seeing the differences between male and female cases of gallstone disease.

Table 4 Level of significance of differences

Sl No	Comparison of mean between	"t"	P
1	t between male cases of '21 to 40 & 41 to 60 years' and '0 to 20 & Above 60 years'	15.485	$P < 0.001$
2	t between female cases of '21 to 40 & 41 to 60 years' and '0 to 20 & Above 60 years'	3.651	$P < 0.05$
3	t between male and female cases	0.822	$P > 0.05$

CONCLUSION

The number of male cases of gallstone disease in the age group of '21 to 40 years' & '41 to 60 years' combined together is higher than that of '0 to 20 years' & 'Above 60 years' with very high significance ($P < 0.001$). Likewise the number of female cases of gallstone disease in the

age group of '21 to 40 years' & '41 to 60 years' combined together is higher than that of '0 to 20 years' & 'Above 60 years' with significance ($P < 0.05$).

On the other hand if we consider all age groups together i.e. '0 to 20 years', '21 to 40 years', '41 to 60 years' & 'Above 60 years' then though the number of female cases are higher than that of male cases it is without any significance ($P > 0.05$).

Finally, it can be concluded that the incidence of gallstone disease are much more from 2nd decade to the end of 5th decade of life than other period of life and there is no significant differences between male and female incidence.

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Declarations:

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REFERENCES

1. Sherlock S. Disease of the Liver and Biliary System. 1968;4(2):245.
2. Kapoor VK. and McMichael AJ. National Medical Journal of India. 2003;1:20.
3. Rains and Ritchie: Gallstone diseases of human. Brit Med Jour 1985;4(2):32.
4. Norman S Williams, Christopher J.K. Bulstrode, P Ronan O'Connell. Bailey and Love's. Short Practice of Surgery. 25th ed. 338 Euston Road, London: Hodder Arnold; 2008.
5. Potter AH and Springfield. Gallstones. Ind J surg 1928;59:214-217.
6. Colcock BP and Mc Manus JE. A study on biliary abnormalities. Surg Clin 1955;35:765.
7. Glenn F. Surgery of Gallbladder. Surg Gynaec and Obstet 1959;109:591.
8. Bhansali SK. Surgery of the bile duct for nontumorous pathology. IJS July 1985;47:291-307.
9. Mason GR. Bacteriology and Antibiotic selection in biliary tract surgery. Archives of surgery 1968;97:535-537.
10. Wollock Y, Glanz I. and Dintzman M. Spontaneous biliary-enteric fistulas, some considerations on the management of Gallstones. Amer J Surg 1976;131:680.
11. Kozoll D.D. Abdomen. A.M.A. Arch Surg 1959;79:514.
12. Chhuttani PN, Sachdeva Y and Chitkara NL. Comparative study on mammalian gallbladder. Jour Assoc Phy 1996;13:140-144.
13. Gunn A and Keddie N. Gallstones. Lancet 1972;2:239.
14. Bhansali SK. Biliary diseases. J Post Grad Med 1982;26:74-85.
15. Pal V, Lakhtakia HS, Gahlaut YVS, Bhargav SK. Clinico-pathological study of Cholecystitis: IJS 1980;42:426-431.

ORIGINAL PAPER

A Study of Asphyxial Death Cases in Medico-Legal Autopsy

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ABSTRACT

Literally, the term asphyxia means absence of pulsation (pulselessness), though its usage in Forensic Medicine has generally come to mean a lack of oxygen. Actually Asphyxia is best described as an interference with respiration due to any cause – Mechanical, Environmental, or Toxic¹. During the year 2011 and 2012, 2777 and 2793 autopsies were conducted in the mortuary of the department of Forensic Medicine, Gauhati Medical College and Hospital, Guwahati, out of which asphyxial deaths were 15.8% and 19% respectively. So there is an enough scope of doing such an important study as the number of such cases is high. In this study at the Gauhati Medical College, Guwahati, Assam during the period from 1st July 2012 to 30th June 2013, out of the 2772 cases being autopsied in mortuary, 320 (11.54%) cases were of deaths due to asphyxia. Hanging topped the list with 250(78.12%) cases followed by drowning, 64(20%) cases, strangulation, 3 (0.94%) cases and choking, 3(0.94%) cases. The others epidemiological data, i.e. occupation, motive and circumstances of the death, etc. were discussed to know the pattern of asphyxial death cases as well as way of preventions by adopting certain measures.

Keywords: Suicide, hanging, drowning

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INTRODUCTION

As to existing terminology, the word asphyxia enjoys wide usage, especially in the courts - but in everyday speech, the phrase 'an asphyxial death' usually implies one due to mechanical blockage of the air passages. Violent deaths resulting chiefly from asphyxia includes death due to hanging, strangulation, suffocation and drowning. Hanging is usually suicidal, but accidental hanging can occur among children during playing or in toddlers by slipping of restraining straps, or among athletes who are in the habit of exhibiting hanging, or in persons with masochistic or transvestic tendency. Strangulations are almost always homicidal except in children and in workplace accidents in which a tie or other article of clothing is caught on machinery.¹ Sometimes, it is not easy to state whether death is due to suffocation, it is therefore very essential to look for evidences of violence in the shape of external marks surrounding the mouth and nostrils or on the inside of mucosal surface, or on the chest. In northern parts of India, it is not uncommon to throw dead bodies into running streams, to avoid the detection of crime.²

MATERIALS AND METHODS

Material for the present study which is an autopsy based descriptive cross-sectional study consists of 320 cases of asphyxial death cases taken from the medico-legal autopsies performed in the department of Forensic Medicine, Gauhati medical College, Guwahati, Assam during the period from 1st July 2012 to 30th June. The various epidemiological data, i.e. age, sex, occupation, motive and circumstances of death, etc. were gathered from the police papers like inquest report, dead body

challan, etc. and thorough detailed interviews of the friends, relatives, neighbors and police officials accompanying the dead bodies taken separately and results were analyzed.

OBSERVATIONS AND RESULTS

Incidence of asphyxial death cases: Regarding the incidence of asphyxial death cases, out of the **2772** cases being autopsied in mortuary, **320 (11.54%)** cases were of deaths due to asphyxia.

Various methods of asphyxial deaths: The incidence of various asphyxial deaths was recorded and, out of 320 asphyxial death cases, hanging was found to be the commonest of all, 250 (78.12%) of which 173 (54.06%) cases were male, 64 (20%) cases were due to drowning, of which 52 (16.25%) cases were male. Three (0.94%) cases were due to strangulation with female preponderance. All the cases of choking, i.e., 3 (0.94%) were males (**Table 1**).

Table 1 Various Methods of Asphyxial Deaths

Methods of Asphyxia	Male		Female		Total	
	No.	%	No.	%	No.	%
Hanging	173	54.06%	77	24.06%	250	78.12%
Drowning	52	16.25%	12	3.75%	64	20%
Strangulation	1	0.31%	2	0.62%	3	0.94%
Choking	3	0.94%	0	0%	3	0.94%
Total	229	71.56%	91	28.44%	320	100%

Religion wise distribution: In the present study, out of 320 cases, 279 (87.19%) cases belonged to Hindu community, 35 (10.94%) cases were from Muslim community and 6 (1.87%) cases were from Christian community.

Age and sex wise distribution: 106 (33.12%) cases of asphyxial death occurred in the age group 21-30 years of which 82 cases (25.62%) were male and 24 cases (7.5%) were female, followed by 71 (22.19%) cases in the age group 11-20 years, in which 37 (11.56%) cases were male and 34 (10.62%) cases were female. It is also observed from the table that among the 320 cases studied, 229 were male comprising 71.56% and 91 were female comprising 28.44%, the male to female ratio being 2.5:1 (**Table 2**).

Table 2 Age and Sex wise distribution of cases

Age (in years)	Male		Female		Total	
	No.	%	No.	%	No.	%
0-10	05	01.56%	03	0.94%	08	2.50%
11-20	37	11.56%	34	10.62%	71	22.19%
21-30	82	25.62%	24	07.5%	106	33.12%
31-40	42	13.12%	11	03.44%	53	16.56%
41-50	26	08.13%	07	02.19%	33	10.31%
51-60	22	06.88%	06	01.88%	28	8.76%
61-70	11	03.44%	04	01.25%	15	4.69%
71-80	03	0.94%	02	0.62%	05	1.56%
81-90	01	0.31%	00	00%	01	0.31%
Total	229	71.56%	91	28.44%	320	100%

Locality: In the present study, maximum number of incidence was found in rural area, 140 (43.75%) cases, followed by urban area, 133 (41.56%) cases.

Educational status: Majority of the victims were under-metric, 70 (21.88%) cases, followed by 64 (20%) cases, up to primary level, 62 (19.38%) cases up to high-school and 56 (17.5%) cases up to higher-secondary level and 27 (8.33%) cases up to Graduate level or above, 41 (12.81%) cases were illiterate.

Occupational status: Highest number of cases, 72 (22.5%) were students, of which 37 (11.56%) were male and 35 (10.93%) cases were female. This was followed by daily-labourers, 58 (18.12%) cases of which 53 (16.56%) cases were male. 55 (17.18%) cases found to be having service and 52 (16.25%) cases were businessman.

Marital status: In the present study asphyxial death cases were more in the married males 131 (40.93%) followed by married females 47 (14.68%).

Place of occurrence of events: The different places of occurrence are shown in **Table 3**.

Table 3 Place of occurrence of events

Category	Number	Percentage
Residence	225	70.31%
Pond	32	10.00%
Outfield	26	8.13%
River	19	5.93%
Tree	06	1.88%
Working Place	04	1.25%
Well	03	0.94%
Drain	05	1.56%
Total	320	100%

Personal habits of the cases: 105 (32.81%) victims did not have any habit of taking either tobacco or alcohol or any other drugs; 71 (22.19%) victims used to take alcohol only and 49 (15.31%) were addicted to alcohol, tobacco and betel nut (**Table 4**).

Table 4 Personal habits of the victims

Category	No	%
Alcohol	71	22.19%
Alcohol + Betel nut	17	5.31%
Alcohol + Smoking	6	1.87%
Alcohol + Tobacco + Betel nut	49	15.31%
Betel nut	47	14.69%
Betel nut + Tobacco	22	6.88%
Smoking	3	0.94%
Nil	105	32.81%
Total	320	100%

Seasonal variation of the cases: Maximum number of asphyxial deaths occurred during summer season, 90 (28.12%), followed by autumn 86 (26.88%) and spring 85 (26.56%).

Probable nature of death: Suicidal deaths constituted the maximum number, 268, of which hanging constituted the major bulk i.e. 250 (93.28%). Amongst the accidental deaths of 49, drowning cases were 46 (93.88%) and choking cases were 3 (6.12%). All the cases of homicide i.e. 3 (100%) were due to strangulation.

DISCUSSION

The incidence rate of asphyxial death in the present study is found to be 11.54%. The findings of present study are different from the study of Singh A et al³, Palimer Vikram et al⁴, Chaurasia N, Pandey SK et al⁵, and Dhillon Sangeet et al⁶ who observed slightly lower incidence of violent asphyxial deaths in their study. However, Choudhury BL⁷, Patel-A⁸ and Azmak D⁹ observed slightly higher incidence. The findings of present study are similar with the study done by Lalwani S et al¹⁰ in which the incidence of violent asphyxial deaths comprised approximately 11.21% of all forensic autopsies. The reason for variation in the incidence of asphyxial death in the different parts of world may be due to cultural, ethnic, geo-graphical and genetic difference.

In the present study, it was observed that hanging was the commonest form (78.12%) of asphyxial death followed by drowning (20%), choking (0.94%) and strangulation (0.94%). The findings of the present study is similar with the several workers like Singh B et al¹¹, Momochand A et al¹², Azmak D⁹, Palimer Vikram⁴, Chaurasia N, Pandey

SK et al⁵, Choudhury BL⁷ and Patel Ankur et al¹⁸ in which hanging constitutes the majority of cases.

Males were the most common victims with male to female ratio being 2.5:1. In this study, maximum incidence of asphyxial deaths was seen in age group ranged from 21-30 years and then in 11-20 years of age, contributing 33.12% and 22.19% of the total asphyxial deaths respectively. If we add the two groups, it makes 55.31% of the total asphyxial deaths. It clearly indicates that young adults are the main victims of asphyxial deaths. The findings of the present study are similar with the study of Copeland AR¹³, Auer A¹⁴, Majumder BC¹⁵, Lalwani S et al¹⁰, Chaurasia N et al⁵ and Patel-A et al.⁸

In the present study, majority, i.e., 21.88% of the victims was under-metric, followed by 64 (20%) cases, up to primary level. Graduates, post-graduates and illiterate were the least affected group which differs from the study of Pathak NM¹⁶ who found maximum number of cases with education level upto high school standard. Low level of education of the victims found in the study is correlated with the fact that victims either remain unemployed or competition for the job is one of the major anxiety factors among them. Again number of illiterate people committing suicide is also high, poverty and struggles for survival being the main reason among this group of people which increased the number of incidence of suicide among them. Again failure in exams, increased competition for better performance and also failure in love affairs is one of the common cause of suicide among school and college going students.

In the present study, it was observed that students constituted the highest number of cases, 72 (22.5%) followed by the daily labourers 58 (18.12%), service holders and businessman which is similar with the findings of Majumder BC.¹⁵

It was observed that most of the victims were married 178 (55.62%) which is supported by Vijayakumari N.¹⁷

In the present study, 225 (70.31%) cases occurred in their residence, 10% cases in the pond, 8.13% in the outfield, 5.93% in the river, 1.88% in the tree, 1.25% at their working place, 0.94% in the well and 1.56% cases were found in the drain, which is consistent with the study of Vijayakumari N.¹⁷

Hanging, (93.28%), as the method of suicide, was found to be more prevalent among all suicidal deaths the reason being it is painless, materials required are easily available, a wide range of ligatures can be used and has a very high mortality rate. Amongst the accidental deaths of 49,

drowning cases were 46 (93.88%). All the cases of strangulation were homicidal and choking was accidental. The present study is similar with the findings of Davidson A, Marshall TK¹⁸, Majumder BC¹⁵, Lalwani S et al¹⁰, Azmak⁹, Kanchan T, Rastogi P et al¹⁹, Chaurasia N, Pandey SK et al⁵, Patel Ankur et al⁸ and Musaib Mohammed Shaikh M et al.²⁰ The high rate of suicides may be attributed to the increasing number of population resulting in all round deficiencies of food, shelter, educational and health facilities, job opportunities which put the population of the present society at risk of all sorts.

CONCLUSION

In the present study, suicidal deaths as a result of hanging and accidental deaths as a result of drowning seems to be the major contributing causes of asphyxial deaths. Both these manner of deaths, somehow, indicates frustration and carelessness on the part of population which are preventable and needs to be rectified on urgent basis. A well designed and comprehensive programme is needed to identify the causative factors and prevention of suicidal behaviours. Measures to improve the socio-economic conditions through reforms in the fields of education, health, increase in employment opportunities are expected to lessen the existing stress and strain of the society. This in turn will help to decrease the incidence of suicidal, homicidal or accidental cases of asphyxia. Drowning prevention strategies should be comprehensive and include: engineering methods which help to remove the hazard, legislation to enforce prevention and assure decreased exposure, education for individuals and communities to build awareness of risk and to aid in response if a drowning occurs, and prioritization of research and public health initiatives to further define the burden of drowning worldwide and explore prevention interventions.

Conflict of interest: None declared.

Ethical clearance: Taken.

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REFERENCES

1. Saukko P, Knight B. Knight's Forensic Pathology. 3rd ed. London: Arnold Publisher; 2004. p 352-411.
2. Kannan K, Mathiharan J. A textbook of Modi's Medical Jurisprudence and Toxicology. 24th ed. Haryana: Lexis Nexis, Butterworths Wadhwa; 2012. p. 445-77.
3. Singh A, Gorea RK et al. A study of demographic variables of violent asphyxial death. JPAFMAT 2003;3:22-25.
4. Palimar Vikram, Babu Y.P. Fatal mechanical asphyxia. Medico-Legal Update: An International Journal 2009;9(1):4-5.
5. Chaurasia N, Pandey SK, Mishra A. An Epidemiological Study Of Violent Asphyxial Death In Varanasi Region (India): A Killing Tool. J Forensic Res 2012;3:174.
6. Dhillon S, Mahajan A, Sekhon H S. Study of Pattern of Asphyxial Deaths in Shimla Hills. Medico-Legal Update 2013;13(1):118-21.
7. Chaudhary BL. Suicidal Hanging Pattern: A Retrospective Review. Medico-Legal Update 2013;13:1-5.
8. Patel-Ankur P, Bhoot-Rajesh R, Patel-Dhaval J, Patel Khushbu. A Study of Violent Asphyxial Death. International Journal of Medical Toxicology and Forensic Medicine 2013;3(2):48-57.
9. Azmak D. Asphyxial Deaths: A Retrospective Study and Review of The Literature. Am J Forensic Med Pathol 2006 Jun;27(2):134-44.
10. Lalwani S, Sharma GASK et al. Pattern of violent asphyxial deaths in South Delhi: A retrospective Study. Indian Medical Gazette 2004;258-61.
11. Singh B et al. Pattern of suicides in Delhi: A survey of cases reported at police morgue, Delhi. Med Sci Law 1982;22(3):195-198.
12. Momochand A, Devi TM et al. Violent asphyxia deaths in Imphal. JFMT 1998;15(1):60-64.
13. Copeland AR. An Assessment of Lung Weights In Drowning Cases: The Metro Dade Experience From 1978 To 198. Am J Forensic Medicine Pathology 1985;6:301-4.
14. Auer A. Suicide by drowning in Uusimaa Province in Southern Finland. Med-Sci-Law 1990;30(2):175-79.
15. Majumder BC. Study of Violent asphyxia deaths, JIAFM 2002; 24(2):8-10.
16. Pathak N M. Study of histomorphological changes of lungs in cases of asphyxial deaths in medico-legal autopsy (Thesis submitted to the Gauhati University for the degree of Doctor of Medicine of Forensic Medicine) 2008.
17. Vijayakumari N. Suicidal Hanging: A Prospective Study. J Indian Acad Forensic Med. October- December 2011;33:355.
18. Davidson A, Marshall TK. Hanging In Northern Ireland: A Survey. Med-Sci-Law 1984;26(1):23-28.
19. Kanchan T, Rastogi P, Mohanty M. K. Profile of near drowning victims in a coastal region of Karnataka. JIAFM, 2007; 29(4): 52.
20. Musaib Mohammed, Shaikh M et al. A Study of Gross Postmortem Findings in Cases of hanging and ligature strangulation. J Indian Acad Forensic Med. Jan-March 2013; 35: 63.

ORIGINAL PAPER

Factors Associated with Stress Among B.Sc. Nursing Students

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ABSTRACT

Stress is a universal phenomenon and an unavoidable part of human life. In professional courses like nursing, initial period of course is stressful and it adversely affects the emotional, physical, social, and academic functions of the student nurses. A descriptive study was conducted among all the B. Sc. Nursing students studying in B. Sc. Nursing College Dibrugarh to find the level of stress and the factors associated with stress among them and it was found that majority of 85% students had above normal stress, 13% had normal stress and 2% had severe stress. Among the factors contributing to stress, the academic factors had maximum contribution (40%), followed by intrapersonal factors (30%). The environmental factor had only 21% contribution whereas the interpersonal factors contributed minimally (9%). Stress has become a chronic and pervasive condition in the world today. Every person experience different forms of stress throughout their life, therefore a student nurse is no exception as she has to adjust to an entirely new environment on joining the course in nursing. Certainly stress in the college setting cannot be eliminated, but preparing the student nurses to manage it properly can do a better task.

Keywords: Stress, nursing students

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INTRODUCTION

Stress is a universal phenomenon and an unavoidable part of human life. It is the emotional and physical strain caused by our responses to pressure from the outside world¹. It is specific response by the body to a stimulus that disturbs normal functioning. A stressor is an event or any stimulus that cause an individual to experience stress.² Stress results from the interaction between stressor and the individual's perception and reaction to the stressors.^{3,4}

In professional courses like nursing, initial period of course is stressful and it adversely affects the emotional, physical, social, and academic functions of the student nurses. Entering the world of nursing presents the new students with a formidable array of changes. Often still in their teens they are often asked to transform from adolescent to adult and from lay person to professional.^{5, 6} Many of the nursing students move away from home for the first time, which can necessitate leaving all previously learned support system such as parents, siblings and high school friends. Students may need to develop entirely new social contacts and are expected to take responsibility for their own needs. They may have difficulty in adjusting to more rigorous academic expectations and the need to learn to deal with individuals of different culture and belief. Thus stress may result from being separated from home for the first time, the transition from personal to impersonal academics and the vary structure of academic experience at the college level.

Even though the perception and response to stress and way of coping differs individually, it may produce questionable behavioral patterns in student nurses during the course of their study like feeling of loneliness,

nervousness, sleeplessness, and worrying. Thus, the student nurse faces a lot of challenges and problems during their study life.^{7, 8, 9}

Nursing students are valuable human resources. Detection of potential stress among nursing students is crucial since stress can lead to low productivity, low quality of life, and inappropriate patient care and may more. Identifying factors affecting stress among nursing students can help nursing educators to find ways to decrease stress.^{10,11}

Based on the personal life experiences, ground full evidences, the researcher took interest in exploring the level of stress and the factors associated with stress of B. Sc. nursing students. Here, the researcher tries to help student nurses to better understand about the phenomena of stress and its associated factors.

METHODS

A descriptive survey design was used for the study. The study was conducted at B. Sc. Nursing College Dibrugarh during the month of August 2015. The target population consisted of all the B. Sc. nursing students presently studying in B. Sc. nursing College Dibrugarh. Study sample comprised of 175 nursing students. The purpose of the study was explained to the subjects and verbal consent was sought from them. Data was collected by using standardized tool to assess level of stress and self-administered questionnaire to find out the factors associated with stress. It was consisted of demographic profile and checklist of the factors associated with stress in four areas namely academic, environmental, interpersonal and intrapersonal.

A numerical rating scale from 1-3 scores in which score 1 indicates never, score 2 indicates sometimes and score 3 indicates often and under 15=normal, 15-25=above normal and 26-30=severe stress. This stress assessment tool by United Nations Stress Management Booklet was used to assess the level of stress experienced by the subjects regarding different life events.

The content validity and reliability, suggestions were received from five experts in the field of psychology and psychiatric nursing. The data was analyzed as per the objectives using descriptive and inferential statistics.

OBSERVATION AND RESULTS

The study found that out of the 175 students, majority (57%) of nursing students were more than 20 years of age, 38% were 19-20 years and 5% were 17-18 years. Majority (91%) of the nursing students were from nuclear

family, 6% from joint family and 3% from extended family. It was observed that majority (97%) stays in hostel, 2.4% in own home and 0.6% stays in rented house. It was further found that majority of (35%) students are from lower middle class family, 28% from upper middle class, 21% from upper class, 13% from upper lower class and 5% students belong to lower class family.

Stress level among B. Sc. Nursing Students

The nursing students stress was measured by using stress assessment tool by United Nations Stress Management Booklet and it was found that majority of (85%) students had above normal stress, 13% had normal stress and 2% had severe stress (**Table1**).

Table 1 Stress level among B. Sc. Nursing Students n=175

Level of stress	f	%
Normal stress	22	13
Above normal stress	149	85
Severe stress	4	2

Factors associated with stress

From **Table 2** it is found that majority (61%) students were over burdened with study and assignment and 51% of lower grade than anticipation. 50% was overloaded with practical work, 42% had poor satisfaction with class room performance, 41% had less vacation/ break, inability to concentrate on study and inability to balance study and leisure time, less than 35% had stress related with Inability to enjoy study, poor interest in studies, poor IPR with teachers, serious argument with teachers, Missing too many classes and language problem.

Table 2 Academic factors associated with stress

Academic Factors	No of students perceived stress due to given factor (n)%
Less vacation/ break	71(41)
Inability to balance study and leisure time	71(41)
Over burden with study and assignment	107(61)
Inability to concentrate on study	85(41)
Poor satisfaction with class room performance	74(42)
Getting lower grade than anticipation	90(51)
Inability to enjoy study	56(32)
Poor interest in studies	50(29)
Poor IPR with teachers	57(33)
Serious argument with teachers	28(16)
Overload with practical work	87(50)
Missing too many classes	19(11)
Language problem	34(19)

From **Table 3**, it was found that related to the environmental factors majority (53%) had stress related to inadequate facility of canteen, 45% had stress related to lack of recreational facility, 35% had stress related to lack of laundry facility, 23% had stress related to absence of calm and quite environment, 20% had stress related to inadequate water facility and less than 20% had stress related to change in living environment, inadequate telephone facility, inadequate provision of safety and security, extreme climate factors and inadequate supply of electricity.

Table 3 Environmental factors associated with stress

Environmental factors	No of students perceived stress due to given factor (n)%
Change in living environment	28(16)
Inadequate telephone facility	11(6)
Inadequate provision of safety and security	29(17)
Inadequate facility of canteen	92(53)
Lack of recreational facility	79(45)
Lack of laundry facility	62(35)
Absence of calm and quite environment	41(23)
Extreme climate factors	37(21)
Inadequate supply of electricity	16(9)
Inadequate water facility	35(20)

From **Table 4**, it was found that among the interpersonal factors, out of 175 students, majority (22%) had stress related to fight with close ones, 21% had stress related to lack of close and intimate friend, 16% had stress related to conflict with roommate, 15% had lack of co-operation from friends and 10% had stress related to change in social activities.

Table 4 Interpersonal factors associated with stress

Interpersonal factors	No of students perceived stress due to given factor (n)%
Change in social activities	18(10)
Fight with close ones	38(22)
Lack of co-operation from friends	26(15)
Lack of close and intimate friend	37(21)
Conflict with room mate	28(16)

From **Table 5**, it was found that among the intrapersonal factors, majority (59%) had stress related to getting less than parents expectation, 55% had new responsibilities

of life, 46% had change in sleeping pattern, 44% had stress related to change in eating pattern, 38% had homesickness in hostel, 40% had stress related to financial problem, 36% had stress related to decline in personal health, 22% had stress related to death of significant one and 7% had stress related to engagement/marriage.

Table 5 Intrapersonal factors associated with stress

Intrapersonal factors	No of students perceived stress due to given factor (n)%
Change in eating pattern	77 (44)
Engagement/marriage	13(7)
Homesickness in hostel	66(38)
Change in sleeping pattern	80(46)
New responsibilities of life	96(55)
Getting less than Parents expectation	103(59)
Decline in personal health	63(36)
Death of significant one	38(22)
Financial problem	70(40)
Change in religious belief	21(12)

DISCUSSION

Stress is an organism's response to a stressor such an environmental condition or a stimulus. Stress is a body's method of reacting to a challenge. Stress is only harmful when it is excessive.¹² Much of the stress that all people experience from their life experience is helpful and stimulating. But stress if cannot managed properly lead to psychological distress, physical complaints, behavioral problems and poor academic performance.¹³

The present study was conducted to assess the level of stress and the factors associated with stress among the B.Sc. Nursing students presently studying in B. Sc. Nursing College Dibrugarh. The findings of the study revealed that out of 175 students (57%) of nursing students were more than 20 years of age, (91%) of the nursing students were from nuclear family, (97%) stays in hostel and (35%) students are from lower middle class family.

The findings of the study also revealed that (85%) students experienced above normal stress, 13% experienced normal stress and 2% experienced severe stress which was slightly consistent with the study conducted in a private nursing institute of Punjab to assess stress level and

coping strategies among nursing students and found that 34% students had moderate stress, 33% were having mild and severe stress respectively.¹⁴

The result of the present study identified various factors like academic factor (40%), environmental factor (21%), interpersonal factor (9%) and intrapersonal factors (30%) contributing to stress among nursing students. This study is contrast with the study conducted on GNM students on a nursing institute of Faridkot revealed that environmental factor had maximum contribution (40%), followed by the interpersonal factor (30%), the academic factors had only 19% contribution whereas the interpersonal factors contributed minimally.¹⁵

In the present study, among the academic factors 61% students were over burdened with study and assignment and 51% got lower grade than anticipation, 50% were overloaded with practical work and 33% had poor IPR with teachers. Similar factors were identified in another study where source of stress included excessive homework and overload with assignment.¹⁶ Poor IPR with teachers and arguments with teachers were also identified as stressors in another study by Sgan-Cohen and Lowental.¹⁷

From the environmental factors reported by most of the students as stressor, 53% had stress related to inadequate facility of canteen, 45% had stress related to lack of recreational facility.

Regarding the interpersonal factors it was found that out of 175 student 22% had stress related to fight with close ones, 21% had stress related to lack of close and intimate friend and 16% had stress related to conflict with roommate. This study is consistent with the study conducted at Baccalaureate Saudi Nursing Students and found that 26% students had stress related to conflict with roommate and 29% had stress related to fight with close ones.¹⁸

Among the intrapersonal factors it was observed that 59% had stress related to getting less than parents expectation, 40% had stress related to financial problems, 36% had stress related to decline in personal health. This study is too some extent similar with the study conducted at the college of nursing, Ireland on 70 students which showed that financial issues and poor personal health were perceived as major stressor among the nursing students.¹⁹

CONCLUSION

Stress has become a chronic and pervasive condition in the world today. Present era is marked as an era of stress. Every person experience different forms of stress throughout their life, therefore a student nurse is no exception as she has to adjust to an entirely new environment on joining the course in nursing. Certainly stress in the college setting cannot be eliminated, but preparing the student nurses to manage it properly can do a better task.

Conflict of interest: None declared.

Ethical clearance: Taken.

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Declarations: (1) The article is original with the author and does not infringe any copyright or violate any other right of any third parties; (2) The article has not been published (whole or in part) elsewhere, and is not being considered for publication elsewhere in any form, except as provided herein; (3) I take public responsibility for it and (4) I have reviewed the final version of the above manuscript and approve it for publication.

REFERENCES

1. Basavanthappa BT. Fundamentals of nursing. 1st ed. New Delhi: Jaypee brothers' medical publishers (P) Ltd; 2004. p.796
2. Romano JL. Psycho educational interventions for stress management and wellbeing. J of Counselling and Development 1992;71:199-202.
3. Sandhya S, Ranjana L. Stress/stressors as perceived by Nepalese nursing students. International J of Nursing Research and Practice 2014;1(2):5-9.
4. Prasad CV, Suresh A, Thomas DK, Pritty MK, Beebi S, Multazim V. The level of stress and coping mechanism adopted by I year B.Sc. nursing students. Arch Medical Health Science 2013;1:19-23.
5. Kumar R, Nancy. Stress and coping strategies among nursing students. Nurse Midwifery Journal 2011;7(4):141-151.
5. Sharma N, Kaur A. Factors associated with stress among nursing students. Nurse Midwifery Journal 2011;7(1):12-21.
6. Kohn JP, Frazer GH. An academic stress scale: Identification and rated importance of academic stressors- Psychological reports. Journal of Advanced Nursing;1986:415-426.
7. Sgan, Cohen HD, Lowental U. Sources of stress among Israeli dental students. Journal of American College Health 1988;36:317-321.

8. Eswi A, Radi S. Stressors as Perceived by Baccalaureate Saudi Nursing Students. *Middle East Journal*. 2013;14(2):193-202.
 9. Honor N. Related stressors among part time undergraduate nursing students. *Journals of Advanced Nursing Programme* 2005;50:93-100.
 10. Gibbons C, Dempster M, Moutray M. Stress and stressors in nursing students. *Journal of Advanced Nursing* 2008;61(3):282-290.
 11. Chan L, Fong T. Hong Kong baccalaureate nursing students' stress and their coping strategies in clinical practice. *Journal of Professional Nursing* 2009;25(5):307-313.
 12. Cohen S, Kamarck T, Mermelstein R. A Global measure of perceived stress. *Journal of Health and Social Behavior* 2010;24(4):385-396.
 13. Edwards D, Burnard P, Bennett, K, Hebden U. A longitudinal study of stress and self-esteem in student nurses. *Nurse Education Today* 2010;30(1):78-84.
 14. Donnell H. The emotional impact of nursing student attrition rates. *British Journal of Nursing*. 2009;18(12):745-75.
 15. Prymachuk S, Richard D. Mental health nursing students differ from other nursing students: some observations from a study on stress and coping. *International Journal of Mental Health Nursing* 2007;16:390-402.
 16. Rella S, Winwood P, Lushington K. When does nursing burnout begin? An investigation of the fatigue experience of Australian nursing students. *Journal of Nursing Management* 2009;17:886-897.
 17. Sheu S, Lin H, Hwang S. Perceived stress and physiopsychosocial status of nursing students during their initial period of clinical practice: the effect of coping behaviors. *International Journal of Nursing Studies* 2002;39(2):165-175.
 18. Weitzel M, McCahon C. Stressors and supports for baccalaureate nursing students completing an accelerated program. *Journal of Professional Nursing* 2008;24(2):85-89.
 19. Watson R, Deary I, Thompson D. A study of burnout in nursing students in Hong Kong: a questionnaire survey. *International Journal of Nursing Studies* 2008;45:1534-1542.
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ORIGINAL PAPER

A Study of Antioxidant Levels in Patients with Diabetes Mellitus

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ABSTRACT

A case control study was undertaken in a tertiary medical care hospital to find out the antioxidant status in patients with diabetes mellitus compared to normal healthy subjects, significance of estimation of serum vitamin C and vitamin E levels as indicators of antioxidant status and development of diabetic complications due to their deficiency. Out of total 60 subjects, 30 healthy individuals were taken as control group and 30 cases of diabetic patients with and without complications were taken as test group. The fasting plasma glucose (FPG), Vitamin C, Vitamin E, Serum total cholesterol, serum triglyceride (TGL), and serum high density lipoprotein (HDL) were estimated by colorimetric methods. The mean serum FPG, vitamin C and vitamin E level in control group and the test group were found to be $81.57 \pm 11.61 \text{ mg\%}$ and $193.43 \pm 52.39 \text{ mg\%}$; $1.388 \pm 1.46 \text{ mg\%}$ and $0.106 \pm 0.103 \text{ mg\%}$; $1.62 \pm 1.429 \text{ mg\%}$ and $0.424 \pm 0.893 \text{ mg\%}$ respectively with a significance of $P < 0.001$. Serum total cholesterol and triglyceride levels were found to be increased and serum HDL was found to be decreased in both complicated and non-complicated diabetes mellitus as compared to control subjects with a significance of $P < 0.001$. The level of antioxidants (vitamin C and vitamin E) is decreased in diabetes mellitus which is more in case of diabetes with complications. Antioxidant status can be used as an indicator of severity complication and duration of diabetes mellitus.

Keywords: Case control study, Vitamin C, Vitamin E, Fasting plasma glucose

INTRODUCTION

It appears that, the service of free radicals occurring in human system is to curtail microbial attack and regulate many vital processes such as apoptosis, neurotransmission, blood pressure regulation, inhibition of platelet aggregation, immune system and so on, but their exaggerated presence can lead to devastating consequences resulting in a vast spectrum of diseases such as cancer, cardiovascular diseases, hepatic and renal disorders, cataracts, aging, infertility and AIDS. Diabetes mellitus is associated with increased lipid peroxidation. Increased levels of lipid peroxides have been implicated in the pathogenesis of diabetic complications.¹

Normally the human body has an abundant supply of antioxidants which are naturally occurring substances, and it is seen that oxidative stress caused by free radicals is counteracted by this abundant supply of antioxidants that is, they delay or inhibit oxidation and neutralize the free radicals. In nature, therefore, when there is a balance of “oxidative stress” and the “antioxidant supply”, there is perfect harmony and no tissue destruction occurs.

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However, if there is an imbalance, i.e., either an excess of free radicals or deficiency of antioxidant supply, tissue damage can occur.

Reports indicate that some complications of diabetes mellitus are associated with increased activity of free radicals and accumulation of lipid peroxidation products.² Recently attention has been given on the relation of antioxidant levels in diabetes mellitus, and it is established that antioxidants have profound effect on lowering various complications in diabetes mellitus. In order to bring the desirable improvement of the sufferings of diabetes with or without complications, the practice of the use of antioxidants can be emphasized. Recent results suggest that the antioxidant deficiency and excessive peroxide-mediated damage may appear in non-insulin dependent diabetes mellitus.³

This study has been undertaken to compare the antioxidant levels (vitamin C and vitamin E) between diabetic and non-diabetic cases and also to see whether serum antioxidant activity can predict the complications in patients with diabetes mellitus.

MATERIALS AND METHODS

A case control study was carried out among the patients of diabetes mellitus with and without complications in the department of Biochemistry, Assam Medical College and Hospital, Dibrugarh, Assam. The study was conducted on thirty (30) diabetic patients admitted in various wards of the Assam Medical college and Hospital, Dibrugarh, Assam. Parallel to these cases, thirty (30) healthy subjects of various age groups have been selected from normal population and their blood were also examined as diabetic patients, and this group is marked as non diabetic or control subjects.

Already diagnosed known diabetic patients of different age groups which were admitted in Assam Medical College and hospital were selected on the basis of the criteria given by American Diabetic Association.⁴

Diabetic cases were divided into two (2) groups on the basis of presence or absence of complications:

- (1) Group I : Diabetic patients with complications – Fifteen (15) numbers
- (2) Group II: Diabetic patients without complications – Fifteen (15) numbers

As complications of diabetes mellitus, the patients had ischemic heart disease, diabetic nephropathy, diabetic

retinopathy, hypertension, peripheral vascular disease and diabetic neuropathy.

Following investigation were done to assess the antioxidant levels and for diagnosis of diabetes mellitus in the subjects:

- (i) Serum vitamin C by colorimetric method of Arya SP⁵
- (ii) Serum vitamin E by Baker and Frank method⁶
- (iii) Fasting Plasma glucose by hexokinase method⁷
- (iv) Serum total cholesterol by homogenous enzymatic colorimetric assay (CHOD-PAP method)⁸
- (v) Serum HDL by enzymatic colorimetric assay⁸
- (vi) Serum triglycerides by GPO/PAP method⁹

RESULTS AND OBSERVATION

Age and sex distribution of the subjects: It was found that maximum numbers of cases in diabetic group were in the age group of 51 – 60 years (43.33%) and this was followed by the age group of 41 – 50 years (30%). No case was found below 20 years of age. Out of 30 cases there were 25 males and 5 females in the diabetic group. Male preponderance was observed with a ratio of 5:1.

Table 1 Age and sex distribution of the subjects

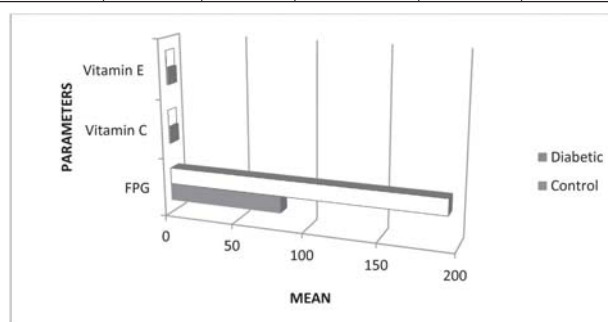
Variables		Diabetic group		Control group	
		Number of cases	Percentage	Number of cases	Percentage
Age in years	0 – 20	0	0	0	0
	21 – 30	4	13.33	4	13.33
	31 – 40	1	3.33	9	30
	41 – 50	9	30	9	30
	51 – 60	13	43.33	7	23.33
	61 – 70	1	3.33	0	0
	71 – 80	1	3.33	1	3.33
	80 and above	1	3.33	0	0
Sex	Male	25	83.33	22	73.33
	Female	5	16.66	8	26.66

Fasting plasma glucose, vitamin C and vitamin E in Diabetic and non-diabetic control groups:

Table 2 Range, mean & standard deviation of fasting plasma glucose, plasma vitamin C & E in controls & diabetics

Different parameters	Controls (No. 30)			Diabetes without complications (No. 15)			Diabetes with complications (No. 15)		
	Range	Mean	SD (\pm)	Range	Mean	SD (\pm)	Range	Mean	SD (\pm)
Fasting plasma Glucose (mg%)	63-102	81.7	11.61	135 - 200	153.13	19.90	180 - 330	233.73	42.96
Vitamin C (mg%)	0.6-1.95	1.388	1.46	0.1 - 0.3	0.193	0.074	0.008-0.09	0.0186	0.023
Vitamin E (mg%)	0.8-1.9	1.62	1.429	0.1 - 0.9	0.482	0.26	0.02-0.09	0.0653	0.0206

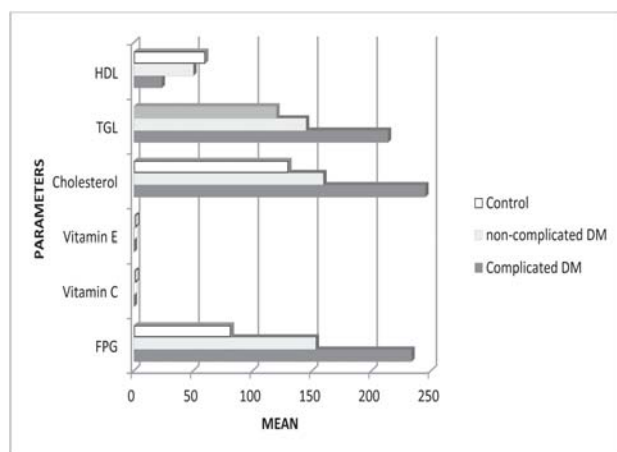
Table 2 shows that mean fasting plasma glucose in non-complicated diabetics and complicated diabetics were higher (153.13 mg% and 233.73 mg% respectively) than the control group (81.57 mg%). Mean vitamin C in non-complicated and complicated diabetics is lower (0.193 mg% and 0.0186 mg% respectively) than the control group (1.388 mg%). Also mean vitamin E in non-complicated and complicated diabetics is lower (0.482 mg% and 0.0653 mg% respectively) than the control group (1.62 mg%).

**Figure 1** Statistical difference in parameters FPG, vitamin C & E between control & diabetic group

The results of vitamin C, vitamin E and plasma glucose levels with serum lipid profile in control group, in diabetics without complication and diabetics with complications have been analysed.

Table 3 Statistical difference between the levels of different parameters of complicated & non-complicated diabetic patients

Groups	No. of cases	Mean \pm SD						P value
		FPG	Vitamin C	Vitamin E	Cholesterol	TGL	HDL	
Complicated diabetics	15	233.73 \pm 42.96	0.0186 \pm 0.023	0.0653 \pm 0.0206	245.33 \pm 35.75	213.86 \pm 17.39	23.63 \pm 4.16	<0.001
Non-complicated diabetics	15	153.13 \pm 19.90	0.193 \pm 0.074	0.482 \pm 0.26	159.53 \pm 28.77	144.86 \pm 33.11	50.06 \pm 6.03	<0.001

**Figure 2:** Statistical difference in parameters FPG, vitamin C, E, Total cholesterol, TGL (triglyceride) & HDL (high density lipoprotein) between control, complicated diabetics and non-complicated diabetic subjects

DISCUSSION

In the present study, highest number of cases were found in the sixth decade that is between 50 – 60 years (43.33%) followed by fifth decade that is between 40 – 50 years. Similar selection of age group was done by Beisswenger PJ et al.^{10,11} It is also found that among 30 numbers of diabetic patients, 25 were males and 5 were females with a male preponderance of 5:1.

In this study, the plasma vitamin C and vitamin E levels were found to be lowered among the diabetics (0.106 mg% \pm 0.103 and 0.424 mg % \pm 0.893 respectively) than the controls (1.388 mg% \pm 1.46 and 1.62 mg% \pm 1.429 respectively). It was also found that the levels of plasma vitamin C and vitamin E were decreased among the complicated diabetics (0.0186 mg % \pm 0.023 and 0.0653 mg % \pm 0.0206 respectively) to the greater extent than the non-complicated diabetics (0.193 mg % \pm 0.074 and 0.482 mg % \pm 0.26 respectively).

A.J. Sinclair et al¹² studied 25 numbers of complicated and 25 numbers of non-complicated diabetic patients. In each case it was found that there is lower concentration of vitamin C in both the groups than control groups ($P < 0.001$ and $P < 0.01$ respectively) and patients with complications had significantly lower vitamin C level than patients without complications ($P < 0.01$). In contrast to this study, some workers like E Kokoglu¹³ and Saowanee Kajanachumpol¹⁴ had observed in their study that there is an increased vitamin E level in diabetic persons than the control group.

Some other workers like SRJ Maxwell et al¹⁵ in their study on 52 numbers of diabetic patients found that the level of plasma vitamin E were similar in both diabetic patients and healthy control subjects whereas the level of plasma vitamin C was significantly lower in diabetic patients than the control subjects.

So, in the present study a significant statistical difference was observed between the mean values of plasma vitamin C, vitamin E and fasting plasma glucose in the control group and diabetics as a whole. Similarly, a highly significant statistical difference was observed between the mean plasma vitamin C, vitamin E and fasting glucose in complicated and non-complicated diabetics. This observation is similar to the findings by AJ Sinclair.¹²

In this study, a correlation was also made between plasma vitamin C, vitamin E and serum lipid profile parameters namely serum HDL, total cholesterol and triglyceride level of the patients. It was observed that raised fasting plasma glucose is associated with significantly raised serum cholesterol and triglyceride concentration and decreased vitamin C and vitamin E concentrations. It was also observed that the complicated diabetics comparatively have raised serum cholesterol and triglyceride levels and significantly lower vitamin C and vitamin E levels than the non-complicated diabetics. But the serum HDL level was significantly lower in the complicated diabetics than the non-complicated diabetics. Since control of diabetics was deduced from fasting plasma glucose level, it is obvious that poorly controlled diabetics (complicated diabetics) had higher values of serum cholesterol and triglyceride and lower value of serum HDL. For the complicated diabetic group with mean FPG $233.73 \text{ mg\%} \pm 42.96$ mean serum cholesterol and triglyceride values were $245.33 \text{ mg\%} \pm 35.7$ and $213.86 \text{ mg\%} \pm 17.39$ respectively and the mean plasma vitamin C and vitamin E values were $0.0186 \text{ mg\%} \pm 0.023$ and $0.0653 \text{ mg\%} \pm 0.0206$ respectively, whereas for the non-complicated diabetic group with mean

FPG $153.13 \text{ mg\%} \pm 19.90$ mean serum cholesterol, triglyceride, vitamin C and vitamin E values were $159.53 \text{ mg\%} \pm 28.77$, $144.86 \text{ mg\%} \pm 33.11$, $0.193 \text{ mg\%} \pm 0.074$ and $0.482 \text{ mg\%} \pm 0.26$ respectively.

So, the results of this study show that abnormalities of antioxidant status (vitamin C and vitamin E) exist in patients with both complicated and non-complicated diabetes mellitus. Lower levels of vitamin C and vitamin E in diabetics as compared to non-diabetic subjects suggest that vitamin E, the primary lipid soluble antioxidant and vitamin C, the water soluble antioxidant are depleted in a state of increased oxidative stress due to diabetes. Som S Basu¹⁶ Sinclair AJ¹², Jennings PE^{17,18} also found similar results. Although reduced dietary intake or excessive excretion may have a role, the most likely causes of reduced level of vitamin C in diabetics are:

- (a) Increased consumption (oxidation) of vitamin C as a result of increased free radical activity in diabetes (Collier A¹⁹) with increased production of its oxidation product dehydroascorbic acid.
- (b) Failed regeneration of vitamin C from dehydroascorbic acid. Intracellular regeneration of vitamin C from dehydroascorbic acid may be impaired because of competitive inhibition of its transport across the cell membrane by glucose, a structurally similar molecule.

Alternatively, the excessive consumption of NADPH during the conversion of glucose to sorbitol involving aldose reductase (the polyol pathway) during hyperglycemia may also retard the reduction of dehydroascorbic acid.¹⁹ Vitamin C is a pivotal antioxidant with a potent inhibitory effect upon peroxidation of polyunsaturated fatty acids in plasma,²⁰ possibly because of its ability to regenerate antioxidants such as vitamin E.²¹

Lower vitamin E level in diabetics is also found by other workers like Karpen CW^{22,23}, Wohaieb SA et al²⁴, Wolff SP²⁵ etc. The mechanism of Vitamin E deficiency in diabetes is not completely understood. Vitamin E acts as a first line of defence to protect lipid of the cell membrane against lipid peroxidation.²⁶ During the process, it loses one proton and is converted into a radical. However, its concentration is very low in membranes as compared to that of polyunsaturated fatty acids. So, recycling of its radical is essential for it to be an effective antioxidant. The enzyme systems capable of reducing oxidized tocopherol (Vitamin E) have been described. Another possibility is that Vitamin E radicals generated can be

reduced by compounds naturally present in biological systems (Packer JE²⁷) and one such important compound is Vitamin C.

CONCLUSION

In the modern system of life, human beings are exposed to various sources of free radicals which disrupt the equilibrium of biological systems by damaging their major constituent molecules, leading eventually to cell death. It is seen that the diabetic patients are at increased risk of developing various complications due to exposure to free radicals which have been strongly implicated in the pathophysiology of diabetic complications. Diabetic patients also have a well documented defect in antioxidant protection which have been studied by various research workers, and in the present study also it is seen that the level of antioxidants in the complicated cases of diabetes mellitus are remarkably lowered when compared to the diabetes mellitus without complications.

From the study, it can be concluded that antioxidant deficiency appears to be associated with a risk for diabetic complications as the imbalance between reactive oxygen species and antioxidant defence systems may increase the oxidative burden and lead to the damage of macromolecules, and such processes are thought to play a role in pathological process of various diseases including diabetes mellitus. Recent findings suggest that plasma antioxidant levels can be used as index to take precautionary measures to minimize complications of diabetes mellitus.

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REFERENCES

- Ahmad M¹, Khan MA, Khan AS. Naturally occurring antioxidant vitamin levels in patients with type-II diabetes mellitus. *J Ayub Med Coll Abbottabad* 2003 Jan-Mar;15(1):54-7.
- Palanduz S, Ademoglu E, Gokkusu C, Tamer S. Plasma antioxidants and type 2 diabetes mellitus. *Res Commun Mol Pathol Pharmacol* 2001;109(5-6):309-18.
- Memisogullari R, Taysi S, Bakan E, Capoglu I. Antioxidant status and lipid peroxidation in type II diabetes mellitus. *Cell Biochem Funct* 2003 Sep;21(3):291-6.
- American Diabetes Association. Standards of medical care in diabetes—2015. *Diabetes Care* 2015;38(1):S1-S93.
- Arya SP, Mahajan M. Colorimetric determination of ascorbic acid in pharmaceutical preparations and biological samples. *Mikrochim Acta* 1997 Mar;127(1):45-49.
- Baker H, Frank O. *Clinical Vitaminology: methods and interpretation*. New York: Wiley; 1968.
- Kunst A, Drager B, Ziegenhorn J. UV methods with hexokinase and glucose-6-phosphate dehydrogenase. In: Bergmeyer HY, editor. *Methods of Enzymatic analysis*. Deerfield: Verlag Chemie; 1983. p. 163-172.
- Greiling H, Gressner AM, editors. *Lehrbuch der Klinischen Chemie und Pathobiochemie*. 3rd ed. New York: Schattauer Verlag; 1995.
- Stein EA. Lipids lipoprotein and apolipoproteins. In: Teitz NW, editor. *Fundamentals of clinical chemistry*. 3rd ed. Philadelphia: WB Saunders; 1987. p. 448-481.
- Beisswenger PJ. Susceptibility to diabetic nephropathy is related to dicarbonyl and oxidative stress. *Diabetes* 2005;54:3274-3281.
- Beisswenger PJ, Moore LL, Brinck-Johnsen T. Increased collagen linked pentosidine levels and advanced glycosylation end products in early diabetic nephropathy. *J Clin Invest* 1993;92:212-217.
- Sinclair AJ, Lunec J, Girling AJ, Barnett AH. Modulators of free radical activity in diabetes mellitus. In: Emerit I, Chance B, editors. *Role of ascorbic acid in free radicals and aging*. Basel: Birkhauser; 1992. p. 342-352.
- Kokoglu E, Ulakoglu E. The transport of vitamin E in plasma and its correlation to plasma lipoproteins in non-insulin-dependent diabetes mellitus. *Diabetes Res Clin Pract* 1991 Dec;14(3):175-81.
- Kajanachumpol S, Komindr S, Mahaisriyodom. Plasma lipid peroxide and antioxidant levels in diabetic patients. *J Med Assoc Thai* 1997;80:372-377.
- Maxwell SRJ, Thomason H, Sandler D. Antioxidant status in patients with uncomplicated insulin dependent and non-insulin dependent diabetes mellitus. *Eur J Clin Invest* 1997;27:484-490.
- Som S. Ascorbic acid: a scavenger of superoxide radical. *Acta vitaminol Enzymol* 1983;5:243-250.
- Jennings PE, Jones AF, Florkowski CM, Lunec J, Barnett AH. Increased diene conjugates in diabetic subjects with microangiopathy. *Diabetic Med* 1987;4:452-456.

18. Jennings PE. Vitamin C metabolites and microangiopathy in diabetes mellitus. *Diabetes Res* 1987;6:151-154.
19. Collier A, Jackson M, Dawkes RM, Bell D, Clarke BF. Reduced free radical activity detected by decreased diene conjugates in insulin-dependent diabetic patients. *Diabetic Med* 1988;5:747-749.
20. Frei B, Stocker R, Ames BN. Antioxidant defenses and lipid peroxidation in human blood plasma. *Proc Natl Acad Sci USA* 1988;85:9748-9752.
21. Vatassery GT, Smith WE, Quach HT. Ascorbic acid, glutathione and synthetic antioxidants prevent the oxidation of vitamin E in platelets. *Lipids* 1989 Dec;24:1043-1047.
22. Karpen CW, Cataland S, O'Dorisio TM, Panganamala V. Interrelation of platelet, vitamin E and thromboxane synthesis in type I diabetes mellitus. *Diabetes* 1984;33:239-243.
23. Karpen CW, Cataland S, O'Dorisio TM, Panganamala V. Production of 12-hydroxyeicosatetraenoic acid and vitamin E status in platelets from type I human diabetic subjects. *Diabetes* 1985;34:526-531.
24. Wohaieb SA, Godin DV. Alterations in tissue antioxidant systems in the spontaneously diabetic (BB Wistar) rat. *Can J Physiol Pharmacol* 1987 Nov;65(11):2191-5.
25. Wolff SP. Glucose autoxidation and protein modification: the potential role of oxidative glycosylation in diabetes. *Biochem J* 1987;245:243-250.
26. Burton GW, Ingold KU. Vitamin E as an in vitro and in vivo antioxidant. *Ann N Y Acad Sci* 1989;570:7-22.
27. Packer JE. Direct observation of a free radical interaction between vitamin E and vitamin C. *Nature* 1979;278:737-738.

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ORIGINAL PAPER

A Study on Length of Human Appendix in Different Ages

Hazarika Bornali¹, Deka Rup Sekhar²

Received on February 11, 2015; editorial approval on January 1st, 2016

ABSTRACT

The vermiform appendix is a narrow, vermiform (worm like) tube which arises from the posterior medial caecal wall, approximately 2 cm below the end of the ileum. Appendicitis is the most common cause of acute abdomen in young people. Obstruction of the lumen is the dominating factor in acute appendicitis. In appendix lymphoid follicles are absent at birth but accumulate over the first 10 years of life to become a prominent feature of it. But in elderly people, the lymphoid follicles atrophy and are replaced by collagenous tissue, and the appendix may be filled with fibrous scar. The appendix is longest in childhood and gradually shrinks throughout adult life. The present study was undertaken at Gauhati Medical College & Hospital involving the departments of Anatomy and Forensic Medicine. Specimens of appendix were taken from the department of Forensic Medicine before putrefaction of the body. Specimens were collected after due permission / consent from the concerned authority and also from the nearest relatives of the deceased. Appendix of 63 males and 63 females were studied in four age groups as '0 to 20 years', '21 to 35 years', '36 to 50 years' & '51 to 70 years'. The data recorded was analysed statistically using Student's T-test. P value 0.05 is considered as statistically significant. Such a study may be useful in establishing a database which may be useful in medical science.

Keywords: *Appendicitis, lymphoid follicles, inflammation*

INTRODUCTION

The vermiform appendix is located in the right lower quadrant of the abdomen.^{1,2} The small entrance of the dead-end pocket of appendix makes it difficult to clean out and prone to physical blockage, which ultimately is the cause of appendicitis.³ The incidence as per position of appendix has been reported as 65.28% for retrocaecal, 31.01% pelvic, 2.26% subcaecal, 1% preileal and 0.4% for right paracolic / postileal.⁴ The most characteristic feature of the appendix, particularly in young, is the presence of masses of lymphoid tissue in mucosa and submucosa.⁵ Similar to the tonsils, the lymphatic tissue in the appendix is typically in a constant state of chronic inflammation, and it is generally difficult to tell the difference between pathological disease and the "normal" condition.⁶ The commonest positions seen in clinical practice are retrocaecal or retrocolic, pelvic or descending. Other positions are sub caecal, pre ilial and post ilial.⁷ Histologically appendix presents four coats from outside inwards: serous, muscular, submucous and mucous.⁸ The reduction in appendicular lymphoid tissue that occurs in later life may be another reason why the disease is infrequent in elderly.⁹ The appendix is commonly 8 to 10 cm in length (about 3½ inches), though cases upto 20 cm long or more have been reported. It was found that the average length of the appendix in 220 consecutive postmortem examinations to be 9.9 cm. It has been described as tending to be about a centimeter longer in the male than in the female, though some investigators have found no particular difference with sex; its average diameter is about 6 mm at its base.¹⁰ The appendix is the commencement of the large gut. At an early embryonic stage it has the same caliber as the caecum and is in line with it. It is formed by the excessive growth of the right wall of the caecum, which pushes the appendix to the inner side. It varies in length from 2.5 cm to 3 cm. The

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average length is 9 cm.¹¹ According to some author the length of the appendix varies from 2 to 20 cm & the average length is 9 cm in adults.¹²

OBJECTIVES

(i) To find out the length of appendix in male and female in different ages. (ii) To see whether there is any difference of the length of appendix between male and female.

MATERIALS AND METHODS

Materials: Scalpel and forceps (pointed & toothed)

Method: The present study was undertaken at Gauhati Medical College & Hospital involving the departments of Anatomy and Forensic Medicine. Appendix of 63 males and 63 females were studied in four age groups as '0 to 20 years', '21 to 35 years', '36 to 50 years' & '51 to 70 years'.

Collection of specimens: Specimens were collected before putrefaction of the body. Specimens were collected after due permission / consent from the concerned authority and also from the nearest relatives of the deceased.

Measurement of lengths: The lengths of each specimen were measured using same standard for all the specimens. Before measuring the length of the appendix these were cleaned thoroughly by removing the extra tissues with the help of scalpel and forceps. Length was measured between the two ends of the appendix.

OBSERVATION

The results and observations of the present study is tabulated and graphed as follows:

Table 1 Length of male appendix in 0 to 20 years

Serial no.	Age in years	Length in cm
1	1	6.0
2	2	6.5
3	2	7.0
4	4	5.9
5	5	6.7
6	5	9.0
7	7	8.1
8	7	6.5
9	10	7.2
10	10	7.4
11	11	8.0
12	11	8.3

Serial no.	Age in years	Length in cm
13	13	6.0
14	13	7.9
15	15	11.52
16	16	10.2
17	18	11.0
18	19	7.7
19	20	9.0
Sum		149.92
Mean		7.891
S.D.		±1.647
S.E.M.		±0.377

Table 2 Length of male appendix in 21 to 35 years

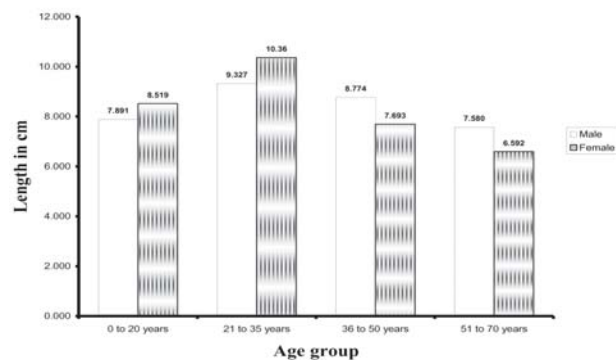
Serial no.	Age in years	Length in cm
1	21	11
2	22	4.5
3	22	3.11
4	23	12.5
5	24	8.5
6	24	3.9
7	25	9.2
8	26	10.3
9	27	11.4
10	27	9.5
11	27	8.8
12	28	13.2
13	29	10.9
14	29	7.0
15	31	9.0
16	32	13.9
17	33	11.0
18	33	7.9
19	33	8.6
20	34	12.1
21	34	10.0
22	35	9.3
23	35	8.9
Sum		214.51
Mean		9.327
S.D.		±2.764
S.E.M.		±0.576

Table 3 Length of male appendix in 36 to 50 years

Serial no.	Age in years	Length in cm
1	36	10.0
2	37	6.5
3	37	11.0
4	40	5.6
5	40	12.1
6	42	9.4
7	43	8.6
8	44	9.9
9	45	12.20
10	49	3.30
11	50	7.91
Sum		96.51
Mean		8.774
S.D.		±2.773
S.E.M.		±0.836

Table 4 Length of male appendix in 51 to 70 years

Serial no.	Age in years	Length in cm
1	52	7.0
2	54	5.10
3	57	6.1
4	59	9.3
5	60	8.9
6	62	9.2
7	65	8.8
8	66	5.5
9	70	9.90
10	70	6.0
Sum		75.8
Mean		7.580
S.D.		±1.816
S.E.M.		±0.574

Mean Length of human appendix**Figure 1** Mean length of appendix for male and female in different age groups**Table 5** Length of female appendix in 0 to 20 years

Serial no.	Age in years	Length in cm
1	1	5
2	2	5.4
3	3	5.2
4	3	6
5	4	6.2
6	4	7.1
7	5	7.4
8	6	9.1
9	8	10
10	9	11.6
11	10	8.7
12	12	12
13	14	9.8
14	15	10.2
15	18	13
16	20	9.6
Sum		136.3
Mean		8.519
S.D.		±2.556
S.E.M.		±0.639

Table 6 Length of female appendix in 21 to 35 years

Serial no.	Age in years	Length in cm
1	21	10
2	23	6
3	23	9.2
4	24	10.6
5	25	11.2
6	27	6.5
7	28	12.5
8	28	9.4
9	29	10
10	30	13.1
11	31	9.8
12	31	8.8
13	32	10.1
14	32	11.6
15	33	12.1
16	33	9.9
17	33	12.2
18	34	13.2
19	35	10
20	35	11
Sum		207.2
Mean		10.360
S.D.		±1.904
S.E.M.		±0.425

Table 7 Length of female appendix in 36 to 50 years

Serial no.	Age in years	Length in cm
1	36	9.3
2	37	8.5
3	37	9.3
4	38	8.2
5	39	7.5
6	40	8.1
7	41	9.1
8	41	6.4
9	42	7.7
10	43	5.1
11	45	8
12	46	6.1
13	47	5.2
14	48	9.0
15	50	7.9
Sum		115.4
Mean		7.693
S.D.		±1.395
S.E.M.		±0.360

Table 8 Length of female appendix in 51 to 70 years

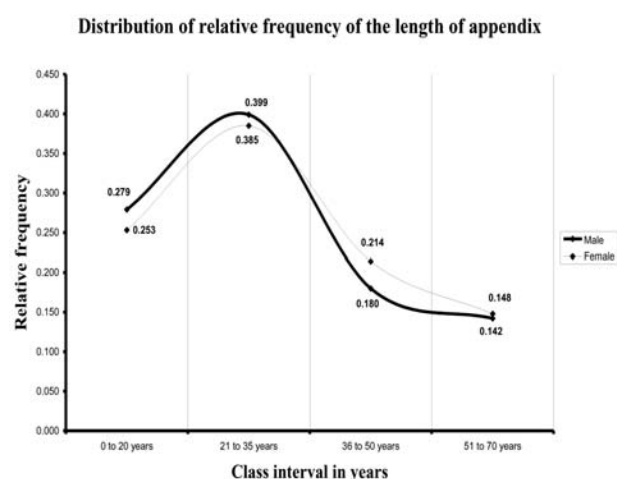
Serial no.	Age in years	Length in cm
1	51	9.6
2	53	10.1
3	55	9.0
4	58	11.9
5	58	8.6
6	60	6.4
7	63	5.4
8	64	5.7
9	65	4.5
10	68	3.6
11	70	2.3
12	70	2.0
Sum		79.1
Mean		6.592
S.D.		±3.226
S.E.M.		±0.931

Table no 9 Frequency, relative frequency & percentage of length of appendix

Class interval	Length of Appendix					
	Male			Female		
	f (frequency)	fr (relative)	f% (percentage)	f (frequency)	fr (relative)	f% (percentage)
0 to 20 years	19	0.279	27.931	16	0.253	25.334
21 to 35 years	23	0.399	39.963	20	0.385	38.513
36 to 50 years	11	0.180	17.982	15	0.214	21.449
51 to 70 years	10	0.142	14.124	12	0.148	14.704
Sum	63	1.000	100.000	63	1.000	100.000

Table 9 shows that for male group highest number of subjects (maximum numbers of subject) are found in the class interval of 21 to 35 years with a relative frequency of 0.399, simple frequency of 23 and a percentage of 39.936. The lowest number of subjects (minimum numbers of subject) are found in the class interval of 51 to 70 years with a relative frequency of 0.142, simple frequency of 10 and a percentage of 14.124 as evident in **Figure 2** and **3**.

For female group highest number of subjects (maximum numbers of subject) are found in the class interval of 21 to 35 years with a relative frequency of 0.385, simple frequency of 20 and a percentage of 38.513. The lowest number of subjects (minimum numbers of subject) are found in the class interval of 51 to 70 years with a relative frequency of 0.148, simple frequency of 12 and a percentage of 14.704 as evident in **Figure 2** and **3**.

**Figure 2** Distribution of relative frequency

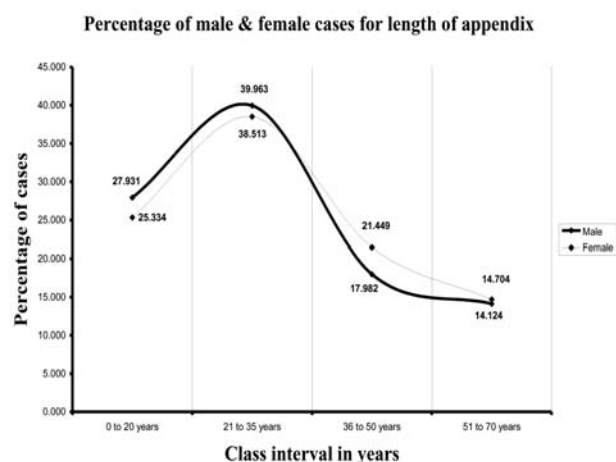


Figure 3 Distribution of percentage

Table 10 Level of significance of differences of length

Comparison of mean between	"t"	P
Length of male appendix of '0 to 20 years' and '21 to 35 years'	2.09	<0.05
Length of male appendix of '21 to 35 years' and '36 to 50 years'	0.553	>0.05
Length of male appendix of '36 to 50 years' and '51 to 70 years'	1.153	>0.05
Length of male appendix of '21 to 35 years' and '51 to 70 years'	2.151	<0.05
Length of female appendix of '0 to 20 years' and '21 to 35 years'	2.403	<0.05
Length of female appendix of '21 to 35 years' and '36 to 50 years'	4.805	<0.001
Length of female appendix of '36 to 50 years' and '51 to 70 years'	1.104	>0.05
Length of female appendix of '21 to 35 years' and '51 to 70 years'	3.687	<0.001

DISCUSSION

Many biological structures can be considered vestiges given our current evolutionary knowledge of comparative anatomy and phylogenetics. In evolutionary discussions the human vermiform appendix is one of the most commonly cited vestigial structures, and one of the most disputed.¹³ The appendix is an evagination of the caecum characterized by a relatively small, narrow and irregular lumen due to presence of abundant lymphoid follicles. It contains fewer and shorter intestinal glands and has no teniae coli.¹⁴ The appendix is commonly 8 to 10 cm in length (about 3½ inches), though cases upto 20 cm long or more have been reported. It was found that the average

length of the appendix in 220 consecutive postmortem examinations to be 9.9 cm. It has been described as tending to be about a centimeter longer in the male than in the female, though some investigators have found no particular difference with sex; its average diameter is about 6 mm at its base. A lot of research has been conducted till date on the size of appendix. Size of the appendix has been described by many authors in different times like Decker, Fisher, Russel *et al*, Brunicardi, Paterson-Brown and Snell.^{15,16,17,18,19,20} Our study is consistent with this universal observation. Length of appendix have been measured in matched sets of observation using the null hypothesis: Reject H_0 if $P \leq t_a$ when $t_a = t_{0.05}$ setting the level of confidence at 95% probability signifying that if the differences in observation between the matched groups is significant at the level of $P < 0.05$, the hypothesis will be rejected establishing differences in length between the tested groups.

CONCLUSION

The average length of appendix in the age group of '0 to 20 years' is 7.891 ± 0.377 cm for males and 8.519 ± 0.639 cm for females; in the age group of '21 to 35 years' 9.327 ± 0.576 cm for males and 10.360 ± 0.425 cm for females, in the age group of '36 to 50 years' 8.774 ± 0.836 cm for males and 7.693 ± 0.360 cm for females, in the age group of '51 to 70 years' 7.580 ± 0.574 cm for males and 6.592 ± 0.931 cm for females.

The length of the male appendix in the age group of '21 to 35' years is more than the age group of '0 to 20 years', which is significant ($P < 0.05$). Whereas the length of the male appendix in the age group of '36 to 50 years' is less than the age group of '21 to 35 years', but without any significance ($P > 0.05$) and length of the appendix in the age group of '51 to 70 years' is less than the age group of '36 to 50 years', but again without any significance ($P > 0.05$). But the length of the male appendix in the age group of '51 to 70 years' is less than the age group of '0 to 20 years', which is again significant ($P < 0.05$). On the other hand length of the female appendix in the age group of '21 to 35 years' is more than the age group of '0 to 20 years', which is significant ($P < 0.05$). Whereas the length of the female appendix in the age group of '36 to 50 years' is less than the age group of '21 to 35 years', which is highly significant ($P < 0.001$) and length of the appendix in the age group of '51 to 70 years' is less than the age group of '36 to 50 years', but without any significance ($P > 0.05$). But the length of the female appendix in the age group of '51 to 70 years' is less than the age

group of '0 to 20 years', but without any significance ($P>0.05$).

Hence, from the above study, we can conclude that the length of both male & female appendix increases up to the age of 35 years. After the age of 35 years the length of the appendix shrinks or reduces up to old age. In male the reduction of size is more significant after the age of 50.

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Conflicts of interest: No conflict of interest is associated with this work.

Contribution of Authors: We declare that the authors named in this article did this work and all liabilities pertaining to claims relating to the content of this article will be borne by the authors.

Ethical clearance: Taken from Institutional Ethical Committee.

REFERENCES

1. Gopalipour MJ, Arya B, Azarhoosh R & Jahanshahi M. Anatomical variations of vermiform appendix in south-east Caspian sea (Gorgan-IRAN). *Journal of Anatomical Society of India* 2003;52(2):141-143.
2. Schwartz SJ, Shires GT, Spencer FC, Dally JM, Fischer JE and Galloway AC. The appendix. *Principles of surgery* 1999;7(3):1383-1385.
3. Liu CD and McFadden DW. "Acute abdomen and appendix". *Scientific Principles and Practice in Surgery* 1997;2(1):1246-1261.
4. Wakely CP. The position of the Vermiform appendix as ascertained by analysis of 10,000 cases. *J Anat* 1993;67:277.
5. Young B, Lowe JS, Stevens A, Heath JW. "Gastrointestinal tract". Chapter 14. *Wheater's Functional Histology* 2007;5:285.
6. Fawcett DW & Raviola E. Bloom and Fawcett. A textbook of histology. Chapman and Hall 1994;6:292.
7. Borley NR and Healy JC. Large intestine. Abdomen and pelvis. *Gray's Anatomy*. Churchill Livingstone. Elsevier 2008;40:1143.
8. Dutta AK. The alimentary system. *Essentials of Human Anatomy*. Thorax and Abdomen 2008;8:221.
9. Stranding S. Large intestine. Abdomen and Pelvis. Section 8. *Gray's Anatomy* 2008;40:1143.
10. Hollinshead WH. The Jejunum, Ileum & Colon. Chapter 9. *Anatomy for Surgeons* 1971;2(2):484.
11. Plessis DDJ. The gut. Chapter IX. A synopsis of surgical Anatomy 1984;11:59.
12. Townsend CM, Beauchamp RD, Evers BM & Mattox KL. The appendix. Chapter 49. *Sabiston Textbook of Surgery* 2009;18:1333.
13. Geoffroy SH. "Observations sur l'aile de l'Autruche, par le citoyen Geoffroy." in *La Decade Egyptienne, Journal Litteraire et D'Economie Politique, Premier Volume, Au Kaire, de L'Imprimerie Nationale* 1978;2:46-51.
14. Junqueira LC, Carneiro J, Contopoulos AN. "Digestive tract" Chapter 16. *Basic Histology* 1971;2: 308.
15. Decker GAG. The large Bowel. Anal canal & Ischio-rectal fossa. Chapter 5. *Lee Mc. Gregor's Synopsis of surgical Anatomy* 1986;12:41.
16. Fisher RE. "The primate appendix: a reassessment". *Anatomical Records* 2000; 261:228-236.
17. Russel RCG, Williams NS & Bulstrode CJK. Vermiform appendix. Chapter 10. *Bailey and Love's short practice of Surgery* 2004;24:1204.
18. Brunicaudi FC. The appendix. Chapter 29. *Schwartz's Principles of Surgery* 2005;8:1119.
19. Paterson-Brown S. "The acute abdomen and intestinal obstruction". *Principles and practice of surgery* 2007;5:15.
20. Snell RS. The abdomen. The abdominal cavity. chapter 5. *Clinical Anatomy by Region* 2008;8:230.

ORIGINAL PAPER

Evaluation of Management of Organophosphorus Toxicity in Tripoli City Hospitals (Libya) and that in Minia University Hospital (Egypt)

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Mahmoud S. Annajar⁴, Nouri M. Elmiladi⁵**

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ABSTRACT

Anticholinesterase insecticides are used worldwide causing serious poisoning. This study was done to evaluate the management of organophosphorus poisoning in Tripoli, and in Minia. 49 cases were studied in Tripoli city hospitals. The study of Minia research was chosen to evaluate the effect and outcome of used fresh frozen plasma (FFP) and magnesium sulphate ($MgSO_4$) in addition to the routine managements of poisoning by organophosphorus compounds (OP) which manifested in the form of gastric lavage, atropine and oximes and the routine methods of treatments of OP toxicity in Tripoli and 64 in Minia university hospital, divided into 4 groups 16 patients/group of both sexes. Group I: (control group); and other groups treated with atropine and oximes plus $MgSO_4$ (Group II), FFP (Group III), FFP and $MgSO_4$ (Group IV). Groups III and IV received two plasma bags (300-400 ml/bag)/day. FFP doses were repeated according to BuChE levels (< 2100 IU/L). There was significant decrease in total plasma bags dose needed in-group IV. There was significant decrease in hospital stay in groups II, III and IV. 2 patients developed intermediate syndrome in-group I, and one in-group II. Use of $MgSO_4$ and FFP gave best result by reducing dose of atropine and oximes, mortality rate and days of hospitalization. 40.8% of Tripoli cases were treated by atropine in addition to the supportive treatment. This study concluded that use of atropine sulphate as antidote for treatment of OP in Tripoli hospitals is not enough, the use of oximes and FFP should be introduced if possible to decrease the fatality rate and the toxicity complications.

Keywords: organophosphorus insecticides, anticholinesterase, plasma, magnesium sulphate, oximes, atropine

INTRODUCTION

Organophosphate compounds (OP) are commonly used as agricultural insecticides. Thus, acute OP pesticides poisoning is widespread in the world.

It has been estimated that around 3 million severe cases of acute pesticide poisonings occur yearly with about 220000 deaths. It is estimated that 95% of fatal pesticide poisonings occur in developing countries.¹

OP irreversibly bind to the enzyme AChE, inhibiting its activity and inducing accumulation and prolonged effects of acetylcholine at a variety of neurotransmitter receptors including sympathetic and parasympathetic ganglionic nicotinic sites, postganglionic cholinergic sympathetic and parasympathetic muscarinic sites, skeletal muscle nicotinic sites, and central nervous system sites.²

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Atropine and oximes (pralidoxime or obidoxime) are traditionally used in the management of such poisonings but their efficacy remains an issue of debate.³ **MgSO₄** and **FFP** have been reported to reduce the toxicity of **OP** compounds in animal experiments.⁴

In this study we planned to evaluate the management of organophosphorus poisoning in Tripoli and in Minia cities, and to enhance the treatment of Tripoli patients.

MATERIALS AND METHODS

A. Minia: 64 adult patients of both sexes with acute **OP** insecticide poisoning were available for study; patients were divided into 4 groups 16/group:

Group 1: (control group): The patients treated with routine management in the form of gastric lavage, administration of 1 g/kg activated charcoal, appropriate bolus and maintenance doses of atropine. Atropine was given either as a continuous infusion (0.02-0.08 mg/kg) /hour or intermittent dosing 0.5-2 mg atropine every 15 min until secretions were controlled. The starting dose of obidoxime was 250-500 mg *i.v.* Additional doses were given in a bolus of 250-500 mg *i.v.* over 30-60 min every 6-12 hours according to severity of poisoning. The other groups treated in same manner plus:

MgSO₄ (4 g/day) *i.v.* (Group II), **FFP** (Group III), **FFP** and **MgSO₄** (Group IV).

Group III: Plasma therapy was started after admission in 14 patients and after developing intermediate syndrome in 2 patients. The last 2 patients were in the atropine and pralidoxime group, but human plasma was given to these patients in order to observe any neuromuscular effects of BuChE after they developed intermediate syndrome. Two bags of plasma (300-400 ml/bag) were given daily until the patients no longer needed atropine. **FFP** doses were repeated according to BuChE levels until a normal level was achieved (≥ 2100 UI/l).

The following parameters were investigated:

1. Serum pseudo Cholinesterase level was measured on admission, a day after a day till patient discharge.
2. Aspartate transeaminase (AST) and Alaninetranseaminase (ALT): Normal value: **AST:** 20-30 u/l, **ALT:** 15-35 u/l.⁵
3. Blood Urea Nitrogen (BUN). Normal value 15-45mg/dl.⁶

4. Serum Creatinine Level: Normal value: 0.5-1.5mg/dl.⁷
5. Serum Electrolytes: (Model 288 Ciba Corning Co.) Standard samples were injected in blood gas analyzer and they were 140 meq/l for sodium, 5.0 meq/l for potassium and 1.4 meq/L for magnesium. Normal value **Na:** 130-145 mEq/l, **K:** 3.5-5.5 mEq/l, **Mg:** 1.5-2.6 mEq/l.
6. Blood Glucose Level Determination: Blood glucose level was determined by enzymatic colorimetric method.⁸
7. Treatment Parameters: Atropine, oximes, **MgSO₄**, Total doses of **FFP** if given, was measured.

B. Tripoli: The study included 49 cases of organophosphorus toxicity. 41% were children.

The estimated average time between exposure and ICU admission to hospital was about 2 hours (ranged from 1 to 3 hours). The investigations: blood glucose, urea, sodium and potassium electrolyte, complete blood picture, pH, and electrocardiography. Treatment was as follow: supportive and symptomatic treatment, Gastric lavage was made to the majority of cases (91.8%), only 4 cases exempted while atropine administrated in 40.8% (20 cases).

Statistical Analysis: Basic analysis of variance allows quick comparison of several groups at once is used in Minia study group.

Data are expressed as means \pm SD

One Way ANOVA test for quantitative data between the groups

$P > 0.05$ Insignificant correlation

$P < 0.05$ Significant correlation

* (**P value < 0.05**)

RESULTS

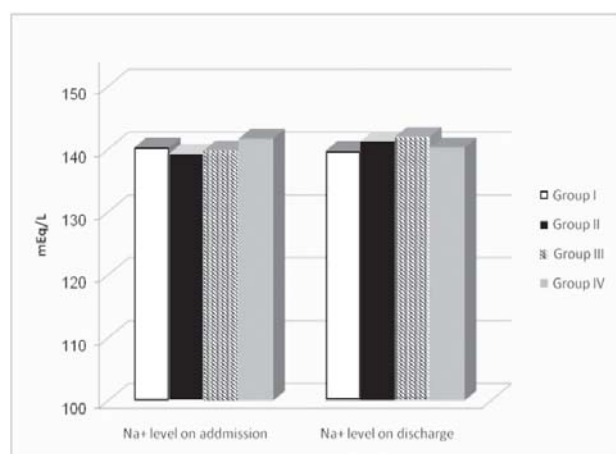
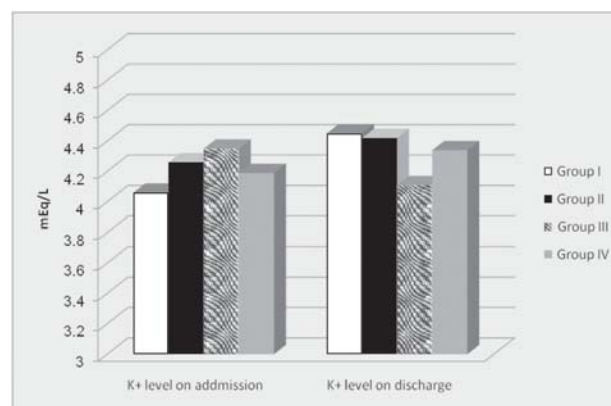
Minia: Ages were 18 to 60 years. The estimated average time between exposure and ICU admission to MUH was 2.6 hours (range, 1–17 hours). The muscarinic features of anticholinesterase poisoning were predominant clinical manifestations (87.5%). Central nervous system (CNS) disturbances (57.81%) and manifested nicotinic symptoms (48.43%).

Biochemical Parameters in Minia:**Table 1** Pseudocholinesterase (BuChE) level in different groups on admission and discharge

BuChE (U/l)		
Groups	BuChE on admission (U/L)	BuChE on discharge (U/L)
Group I	448.44 ± 139.45	954.06 ± 275.65
Group II	436.88 ± 125.20	1036.65 ± 258.65
Group III	444.50 ± 75.75	2450.94 ± 412.19
Group IV	450.31 ± 131.59	2568.75 ± 425.21
P value	0.990	<0.001*
Group I vs. II	0.787	0.509
Group I vs. III	0.927	<0.001*
Group I vs. IV	0.965	<0.001*
Group II vs. III	0.859	<0.001*
Group II vs. IV	0.754	<0.001*
Group III vs. IV	0.892	0.347

Table 2 Na⁺ and K⁺ level on admission and on discharge

Groups Na ⁺ & K ⁺ level on	Group I	Group II	Group III	Group IV	P value
Na ⁺ admission	140.25 ± 4.78	139.31 ± 5.92	139.81 ± 4.49	141.69 ± 5.71	0.615
Na ⁺ discharge	139.75 ± 10.54	141.25 ± 4.37	142 ± 5.56	140.29 ± 3.86	0.775
K ⁺ admission	4.16 ± 0.6	4.26 ± 0.73	4.05 ± 0.56	4.19 ± 0.48	0.596
K ⁺ discharge	3.95 ± 0.43	3.92 ± 0.46	3.89 ± 0.47	3.92 ± 0.69	0.254

**Figure 1** Na⁺ level on admission and on discharge in each group**Figure 2** K⁺ level on admission and on discharge in each group

Glucose level was more than normal values in all groups on admission. Serum ureanitrogen, and creatinine levels showed insignificant changes on admission & discharge.

TREATMENT PARAMETERS

The total dose of atropine & Obidoxime was significantly reduced in groups II, III and IV.

Table 3 Atropine & Obidoximes dose

Total dose of Atropine & Obidoxime Groups	Total atropine dose (mg)	Total obidoximes (gm)
Group I	203.5 ± 77.89	4.73 ± 1.99
Group II	200 ± 70.29	4.9 ± 1.86
Group III	133.88 ± 66.84	3.2 ± 1.18
Group IV	130 ± 58.52	3.12 ± 1.12
P value	0.002*	0.001*
Group I vs. II	0.886	0.756
Group I vs. III	0.006*	0.009*
Group I vs. IV	0.004*	0.006*
Group II vs. III	0.009*	0.004*
Group II vs. IV	0.006*	0.002*
Group III vs. IV	0.874	0.881

Table 4 Hospital stay of the patients for each group (in days)

Groups	Hospital stay (days)
Group I	11.5 ± 2.58
Group II	7.94 ± 1.73
Group III	7.81 ± 1.38
Group IV	5.75 ± 1.34
P value	<0.001*
Group I vs. Group II	<0.001*
Group I vs. Group III	<0.001*
Group I vs. Group IV	<0.001*
Group II vs. Group III	0.847
Group II vs. Group IV	0.001*
Group III vs. Group IV	0.002*

DISCUSSION

Better prognosis and outcome was noted with patients who arrived earlier to the hospital, *Colli*⁹ postulated that the more the time delay the more is the prolonged gastrointestinal absorption, hepatic conversion of OPC to more toxic agents, irreversible inhibition of acetylcholinesterase (AChE) Aging, delayed respiratory management and subsequent tissue damage. The muscarinic features of anticholinesterase poisoning were 87.75%. CNS disturbances were 61.22% (Minia) and 48.43% (Tripoli), nicotinic symptoms were 44.89% (Minia) and 48.43% (Tripoli).

*Ozturk*¹⁰ reported that loss of consciousness and respiratory tract symptoms were the most common features on admission.

The predominance of muscarinic manifestations in adult cases was similar to that reported in previous studies.¹¹ Agarwal and Wali¹² who revealed that muscarinic effects are usually the first to appear followed by nicotinic effects. CNS manifestations are less common than other features.

In contrast, Haddad LM *et al.*¹³ reported that 47.3% of cases presented with ocular manifestations; 61.1% of cases presented with neuromuscular manifestations. Significant increase of pseudocholinesterase level was found in groups that received **FFP**.

After exposure to a toxic dose of anticholinesterase pesticide, plasma cholinesterase activity is rapidly reduced. Untreated patients may see a gradual return to normal activity in 4-6 weeks. Most of the patients showed marked reactivation in plasma ChE within several hours and recovered completely within 24 h. Plasma ChE reactivation

were observed, over the lower limit (1,900 U/l), for 50% of the patients after 12 h of admission. Abd El-Rahman¹⁴ reported same results.

Pseudocholinesterase levels elevation can be used as a prognostic value for effect of treatment of Organophosphorus poisoning.¹⁵ Unfortunately these investigations carried out in Tripoli hospitals.

*Amr et al.*¹⁶ noted that there is no significant elevation of blood urea nitrogen and serum creatinine in persons exposed to OP, as the results that we have.

There was significant increase in magnesium blood level in Group II & Group IV. Also, *Pajoumand et al.*⁴ reported that the serum Mg^{+2} level increased in Mg^{+2} treated subjects after treatment with $MgSO_4$ and the difference between Mg -treated and Mg^{+2} non treated in Mg^{+2} levels was significant (1.869/0.06 mEq/L in Mg -treated versus 1.619/0.03 mEq/L in Mg^{+2} non treated, (P= 0.01).

There was insignificant change in serum sodium level in patients of Minia and Tripoli but there was significant decrease in serum potassium level in Minia only, this no change depend on time of hospital arrive or the ingested dose in Tripoli case.

Blood glucose levels significantly increase in Minia and Tripoli. Osmundson¹⁷ stated that hypokalemia and hyperglycemia are well-documented findings in anticholinesterase intoxication.

The treatment with atropine (as an anticholinergic agent) and oximes (as cholinesterase reactivators) has failed to prevent morbidity or mortality in some cases.¹⁸

*De Silva et al.*¹⁹ reported that pralidoxime & atropine does not have any benefit over atropine alone. Moreover, hepatotoxicity and cholinesterase inhibition may be seen due to oximes.

E. Gunay²⁰ reported that single dose of $MgSO_4$ therapy may be not sufficient in poisoning with OP compounds. Although there was a reduction in the mortality with $MgSO_4$ treatment, this decrease in incidence did not reached statistical significance.

There was significant decrease in total plasma bags doses needed in Group IV to which we added $MgSO_4$ plus frozen plasma.

*Guven et al.*²¹ used **FFP** in the treatment of OP poisoning in addition to traditional therapy, and its effects on outcomes and BuChE levels were excellent.

Zhong *et al.*²² suggested that the transfusion of fresh blood may prove useful in the treatment of OP poisoning.

There was significant reduction in hospital stay in groups receiving magnesium sulphate and **FFP**. **Eddleston²³** demonstrated that the mortality rate and hospitalization days of patients who received MgSO_4 treatment were significantly lower than those who had not received MgSO_4 .

Finally, further studies are needed to follow up patients exposed to anticholinesterase poisoning for early detection and treatment to avoid complications and mortality.

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Ethical clearance: Taken.

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REFERENCES

- Jalali N, Pajoumand A, Abdollahi M, Shadnia Sh, Pakravan N. Pesticides poisoning: one-year report of Loghman-Hakim Hospital Poison Center. *Prog Med Res* 2003;1:1-9.
- Tafari J and Robert J. Organophosphate poisoning. *Ann Emerg Med* 1987;16:193-202.
- Abdollahi M, Jafari A, Jalali N, Balai MM, Kebriaeezadeh A, Nikfar S. A new approach to the efficacy of oximes in the management of acute organophosphate poisoning. *Iran J Med Sci* 1995;20:105-109.
- Pajoumand A, Shadnia S, Rezaie A, Abdi M and Abdollahi M. Benefits of magnesium sulfate in the management of acute human poisoning by organophosphorous insecticides. *Human Exp. Toxicol* 2004; 23:565-569.
- Frankel S and Gradwohl EC. A colorimetric method for determination of serum transaminases. *Am J Clin Path* 1970;28:26-34.
- Lawrence H. Robert T. Kinetic determination of creatinine. In: Siest G, Henny J, and Schiele F, *et al.*, (ed.): *Interpretation of clinical laboratory tests*. Biomedical publishers 1993;220-234.
- Houot O. Kinetic determination of creatinine. In: Siest G, Henny J and Schiele F, *et al.*, (eds.): *Interpretation of clinical laboratory tests*. Biomedical publishers 1985;220-234.
- Trinder P. Glucose GOD-PAP method (Enzymatic colorimetric methods). *Ann Clin Biochem* 1969;6:24.
- Ozturk MA, Kelestimur F, Kurtoglu S, *et al.* Anticholinesterase poisoning in Turkey-Clinical, laboratory and radiological evaluation of 269 cases. *Hum Exp Toxicol* 1990;9:273-9.
- Lee P, Tai DYH. Clinical features of patients with acute organophosphate poisoning requiring intensive care. *Intensive Care Med* 2009;27:694-9.
- Agarwal P, and Wali JP. Diagnosis and management of common poisoning. Calcutta: Oxford Univ Press; 1997. p. 297-304.
- Abd El- Rahman El- Naggat and Mohammed Shehata Abdalla and Alaa S. El-Sebaey and Sayed M Badawy. Clinical findings and cholinesterase levels in children of organophosphates and carbamates poisoning. *Eur J Pediatr* 2009;168:951–956.
- Tsai J, Sheu C, Cheng M, Hung J, Wang C, Chong I, Huang M, Hwang. Organophosphate poisoning: 10 years of experience in southern Taiwan. *Kaohsiung J Med Sci* 2009;23:112-119.
- Amr MM, El-Batanouni M, Emara A, *et al.* Health profile of workers chronically exposed to pesticide in two large scale formulating plants in Egypt. *Egyptian Journal of Occupational Medicine* 1990;14(2): 211-228.
- Osmundson M. Insecticides and pesticides. In: *Emergency toxicology*, 3rd ed. Vaccellio P ed. Philadelphia: Lippincott Raven; 2002. p. 401-409.
- Sungur M and Guven M. Intensive care management of organophosphate insecticide poisoning. *Crit Care* 2001;5(4):211-215.
- De Silva HJ, Wijewickrema R, Senanayake N. Does pralidoxime affect outcome of management in acute Organophosphorus poisoning? *Lancet* 1992;339:1136–38.
- Guyen M, Sungur M, Eser B, Sari I, Altuntas F. The effects of fresh frozen plasma on cholinesterase levels and outcomes in patients with organophosphate poisoning. *J Toxicol Clin Toxicol* 2004;42(5):617–623.
- Zhong, P., Wang, Q. and Sheng, H. Alteration of banked blood cholinesterase level and its significance in emergency treatment of acute organophosphorus pesticide poisoning. *Zhonghua NeiKeZaZhi* 2000;39(10):658-659.
- Eddleston M. The pathophysiology of organophosphorus pesticide self-poisoning. *Neth J Med* 2008;66:146–148.
- E. Gunay, Ibrahim Sari and Abdullah T. Demiryurek. Cardiac Effects of Magnesium Sulfate, Pretreatment on Acute Dichlorvos-Induced Organophosphate Poisoning: An Experimental Study in Rats. *Biol Trace Elem Res* 2010;133:227–235.
- Duran NJ and Colli QJ. Acute pesticide poisoning. *Slaud Publica Mex* 2000;52(1):53-5.
- Haddad LM, Shannon MW, Winchester JF. Clinical Management of poisoning and drug overdose. Philadelphia: WB Saunders Co; 1998. p. 836-45.

ORIGINAL PAPER

A Comparative Study of the Survivors and Non-Survivors of Acute Respiratory Distress Syndrome

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ABSTRACT

Acute respiratory distress syndrome (ARDS) is a life threatening condition in which respiratory failure occurs due to lung injury caused by various etiological factors. Acute hypoxemic respiratory failure as occurs in ARDS requires positive pressure ventilation. ARDS is a major cause of morbidity and mortality; and it also leads to major expenditure in intensive care units. This is a comparative hospital based observational study conducted over a period of one year in an emergency ICU to compare the clinical profile of survivors and non-survivors of ARDS. Included in the study were adult patients who fulfilled the criteria for ARDS according to the Berlin Definition of 2012. The study included 44 patients with ARDS, which was 6.3% of the total number of patients admitted to emergency ICU. There was no significant difference in relation to age among survivors and non-survivors. Non-pulmonary sepsis was the most common cause of ARDS (29.5%) followed by aspiration (22.7%), shock (18%), pneumonia (14%), pancreatitis (11%), malaria (9%) and major trauma (7%). The mortality in our study was 54.54%. The mean initial $\text{PaO}_2/\text{FiO}_2$ ratio in survivors (162.8 ± 41.89) was more than that in non-survivors (88.9 ± 7.71); the difference being statistically significant ($p < 0.0001$). Out of the non-survivors, 54% had sepsis as the cause. Non-survivors have lower oxygenation ratio at presentation and more number of organ dysfunction.

Keywords: ARDS, Acute lung injury, Mechanical ventilation

INTRODUCTION

The acute respiratory distress syndrome was first described in a study by Ashbaugh and Petty in 1967.¹ Pathologically it is characterized by diffuse alveolar damage, alveolar capillary leakage, and protein rich pulmonary edema leading to gas exchange abnormalities and altered lung mechanics. The most common causes are sepsis, pneumonia, aspiration, trauma, pancreatitis, multiple blood transfusions, smoke or toxic gas inhalation, and certain types of drug toxicity.²

Acute hypoxemic respiratory failure as occurs in ARDS requires positive pressure ventilation for achieving desired oxygenation of blood as was first reported in the study by Ashbaugh et al. in 1967.¹ However, care must be taken not to exacerbate the lung injury by causing stretching and over distension of alveoli by injudicious mechanical ventilation.^{3, 4} To protect the lungs from further injury certain lung protective measures are adopted, e.g. the restriction of tidal volume, limiting plateau pressure in lungs and application of positive end expiratory pressure.⁴ ⁵ Substantial variation in mortality in ARDS can occur depending upon the underlying disorder. The risk of death

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appeared to be the highest in patients with ARDS with sepsis, intermediate in patients with pneumonia, aspiration and lowest in those with trauma.⁶

The incidence of ARDS varies widely. Estimates from prospective cohort studies in the United States ranged from 64.2 to 78.9 cases per 100,000 person-years.^{7,8} Estimates from Northern Europe (17 cases/100,000) and Australia and New Zealand (34 cases/100,000) are much lower.^{9,10} Reasons for such large variation in ARDS incidence are unclear, and may be due to differences in demographics, variability of identification of the disorder by health care providers and different criteria used for diagnosis.

The mechanism of lung injury may be direct as occurs in aspiration, inhalational injury, pneumonia, lung contusion, near-drowning, fat embolism, etc. or indirect as in sepsis, major trauma, acute pancreatitis, severe burns, shock, drug overdose and multiple transfusions.² Controversies exist in the definition of ARDS. Murray's expanded definition of ARDS¹¹, American European Consensus Conference (AECC) criteria of 1994¹² Delphi consensus criteria and recently the Berlin definition¹³ are the most commonly adopted definitions of ARDS. The new definition categorized ARDS into mild, moderate and severe categories based on the $\text{PaO}_2/\text{FiO}_2$ ratio with PEEP or CPAP ≥ 5 cm H_2O .

The pathological features of ARDS are described as evolving through three phases, viz. an exudative phase, a proliferative phase and, lastly, a fibrotic phase. The degree of fibrosis is a key predictor of outcome.¹⁴ The major features of ARDS on chest radiography comprise bilateral, widespread, patchy, ill-defined lung opacification usually without cardiomegaly and upper zone blood diversion. The opacities progress in severity to produce confluent airspace opacification with variable distribution, but usually all lung zones are involved both centrally and peripherally.

In a comparative study by Puybasset et al. it was seen that end-expiratory lung volume and functional residual capacity (FRC) were reduced in ARDS patients in comparison to healthy volunteers.¹⁵ Collapse occurs mainly in the dependent lung, where the superimposed weight from above is greatest.¹⁶ Measurements of pulmonary mechanics in mechanically ventilated patients with ARDS showed decreased static lung compliance as a consequence of loss of ventilated lung.¹⁷ The airflow resistance is also increased in ARDS as a result of decreased lung volume, bronchospasm caused by

inflammatory mediators, and can contribute to derangement of lung mechanics.¹⁸ Survival of patients with ARDS is linked to both non-pulmonary organ failure and recurrent infection.

Conventional ventilation is based on the strategy of maintaining the lowest positive end-expiratory pressure (PEEP) for desired oxygenation, with a tidal volume of 10-15 ml/kg body weight and normal PaCO_2 level.¹⁹ In the ARMA trial which was a randomized, controlled, multicenter clinical trial designed to compare a lower tidal volume with a higher tidal volume ventilatory strategy, a lung protective ventilation strategy was recommended involving a restriction of tidal volume to less than 6ml/kg predicted body weight and a maximum plateau pressure (Pplat) of 30 cm H_2O and application of positive end-expiratory pressures, permissive hypercapnia, and preferential use of pressure-limited ventilatory modes.

MATERIALS AND METHODS

This was a comparative hospital based observational study, involving patients admitted to emergency ICU of Gauhati Medical College and Hospital over a period from August 2014 to July 2015. All patients fulfilling the criteria of ARDS according to the Berlin definition were included in the study. Patients of chronic obstructive airway disease, chronic interstitial lung disease, active pulmonary tuberculosis, heart failure, decompensated chronic liver disease, end stage renal disease and patients of less than 18 years of age were excluded from the study.

The initial ventilator parameters viz. ventilator mode, tidal volume, respiratory rate, peak inspiratory pressure, plateau pressure, positive end expiratory pressure (PEEP), fraction of oxygen in inspired air (FiO_2), were recorded after 20 minutes of initiating mechanical ventilation. The FiO_2 value required to maintain SpO_2 between 88-95% at a minimum PEEP level of 5 cm H_2O was recorded. If oxygen saturation was not maintained in the desired range than PEEP and FiO_2 titration were set according to the PEEP/ FiO_2 tables of the ARDS Network protocol. Arterial blood gas analysis was done after 20 minutes of initiation of mechanical ventilation and findings were recorded. Patients were then categorized as having mild, moderate or severe ARDS based upon the $\text{PaO}_2 / \text{FiO}_2$ ratio according to the Berlin definition. Arterial blood gas measurements were repeated every 24 hours. Chest radiograph findings were recorded every day till weaning. Ventilator parameters, tidal volume, plateau pressure, PEEP, static compliance, respiratory rate,

FiO₂ were recorded every 24 hours after the initiation of mechanical ventilation. Patients were monitored daily for signs of non-pulmonary organ failure. Organ failure was assessed according to the Sequential Organ Failure Assessment (SOFA) score criteria.

Results of numerical variables were reported as Mean (\pm SD), relative risks with 95% confidence intervals (CIs). Categorical variables were reported as percentage. Student t test and Kruskal-Wallis test was applied as test of significance for numerical data and Fisher Exact test for categorical data. SPSS 16.0 software was used for statistical analysis.

RESULTS

The number of patients with ARDS included in this study was 44 which were 6.3% of the total number of patients admitted to emergency ICU during the study period. There were 20 survivors (45.46%) and 24 non-survivors (54.54%).

The frequency distribution of etiological factors of ARDS is shown in **Table 1**. Non-pulmonary sepsis is found to be the most frequent cause in 13 cases (29.5%), followed by aspiration (22.7%) and shock (20.4%).

Table 1 Frequency Distribution of etiological factors of ARDS seen in this study

Etiological Factor	Frequency (n=44)
Non-pulmonary sepsis	13 (29.5%)
Aspiration	10 (22.7%)
Shock	9 (20.4%)
Pneumonia	6 (13.6%)
Acute Pancreatitis	5 (11.3%)
Malaria	4 (9%)
Major trauma	3 (7%)
Fat Embolism	2 (4.5%)
Anaphylaxis	1 (2.25%)
Drug overdose	1 (2.25%)

Table 2 shows the cause wise distribution of mortality, the highest mortality being in cases of Non-pulmonary sepsis (76%).

Table 2 Cause wise distribution of mortality in ARDS

Cause	Total patients (n=44)	Death
Non-pulmonary sepsis	13	10 (76%)
Pneumonia	6	4 (67%)
Aspiration	10	3 (30%)
Acute pancreatitis	5	3 (60%)
Malaria	4	2 (50%)
Major Trauma	3	1 (33%)
Fat Embolism	2	0 (0%)
Drug overdose	1	1 (100%)
Anaphylaxis	1	0 (0%)

A comparison of various factors among survivors and non-survivors is shown in **Table 3**.

Table 3 Comparison of the various contributing factors among survivors and non-survivors

	Survivorsn =20	Non-survivorsn =24	p value (Unpaired t-test)
Age (Mean \pm SD)	39.25 \pm 17.39	41.3 \pm 11.45	0.644
Initial PaO ₂ /FiO ₂ (Mean \pm SD)	162.8 \pm 41.89	88.9 \pm 7.71	<.0001
Static compliance (Cs)ml/cm H ₂ O (Mean \pm SD)	27.2 \pm 7.76	25.7 \pm 5.83	0.47
Number of non-pulmonary organ failure (Mean \pm SD)	2.75 \pm 1.61	3.87 \pm 1.36	0.0092

Table 4 shows comparison of mortality in patients with sepsis and other causes. Sepsis was found to be associated with the highest number of deaths.

Table 4 Comparison of mortality in patients with sepsis and other causes

	Dead	Alive	Total	Relative Risk	p value (by Fisher exact test)
Sepsis	13 (29.5%)	3 (6.8%)	16 (36.4%)	2.1(95% CI 1.2 to 3.5)	0.011
Other	11 (25%)	17 (38.6%)	28 (63.6%)		
Total	24 (54.5%)	20 (45.4%)	44 (100%)		

DISCUSSION

The incidence of ARDS in patients admitted to emergency department reported by various authors range from 8.7% (Goyal et al.)²⁰ to 7% (Elie-Turenne et al.)²¹ and 6.8% (Gajic et al.)²². In our study this was found to be 6.3% of the total number of patients admitted to emergency ICU.

Non-pulmonary sepsis was found to be the most common cause of ARDS (29.5%) followed by aspiration (22.7%), shock (20.4%), pneumonia (13.6%), pancreatitis (11%), malaria (9%) and major trauma (7%). The finding of sepsis as the major cause was also reported by Gajic et al.²², Rubenfeld et al.⁷, while Bhadade et al. reported malaria in (27.6%) and leptospirosis (20.7%) as important causes of ARDS.²³

In this study 76% of patients with non-pulmonary sepsis and 67% of the pneumonia patients with ARDS died. Rubenfeld et al. reported mortality rate varying from 24.1% among patients with severe trauma to 40.6% among patients with severe sepsis.²⁴

The mean age of the survivors was 39.25 ± 17.39 years and that of non-survivors was 41.3 ± 11.45 years, which was not statistically significant ($p = 0.644$). In a study by Rubenfeld it was seen that mortality increased with age from 24% (15 to 19 years) to 60% in patients 85 years of age or older ($P < 0.001$).⁷ Suchyta et al. found significant increase in mortality in ARDS with age more than 65 years.²⁵ But Singh et al. found no statistically significant difference in the mean age of survivors and non-survivors.²⁶

The mortality in our study was 54.54%. Agarwal et al reported 47.8% hospital mortality rate for ARDS.²⁷ There had been a decreasing trend in mortality in ARDS patients which might be attributed to the widespread adoption of the lung-protective mechanical ventilation strategies. The ARMA trial of ARDS Net group showed mortality of 21% in those with lung-protective mechanical ventilation vs. 40% in those with conventional ventilation.⁷ Erickson et al. observed that mortality in ARDS was 35% in 1996-1997 and declined to a level of 26% in 2004-2005.²⁸ In 2005 Rubenfeld et al. reported in-hospital mortality rate of 41.1% for ARDS.⁸ In a recent prospective, multicenter observational study by Villar et al.²⁹, it was seen that despite use of lung protective ventilation, ICU mortality of ARDS patients was still more than 40%.

In our study the mean initial $\text{PaO}_2/\text{FiO}_2$ ratio in survivors was 162.8 ± 41.89 and in non-survivors it was 88.9 ± 27.71 . The difference was statistically significant ($p < 0.0001$).

The ARDS task force conducted a meta-analysis of 7 clinical trials and prepared the draft of the Berlin definition in which they observed that mortality in mild ARDS was 27%, in moderate ARDS 32%, and in severe ARDS 45% and the difference was statistically significant ($p < .001$). Esteban et al.³⁰ reported mortality of 25% in the group of patients with $\text{PaO}_2/\text{FiO}_2$ of 200-300, 31% with $\text{PaO}_2/\text{FiO}_2$ 150-199, 47% with $\text{PaO}_2/\text{FiO}_2$ of 100-149 and 83% with $\text{PaO}_2/\text{FiO}_2$ of less than 100. Villar et al. observed that $\text{PaO}_2/\text{FiO}_2$ ratio at the time of ARDS identification had an inverse relationship to mortality.²⁹

The static lung compliance (Cs) at initiation of mechanical ventilation was 27.2 ± 7.76 ml/cm H_2O in survivors and 25.7 ± 5.83 ml/cm H_2O in non-survivors in this study. The difference is not statistically significant. Kangelaris et al.³¹ observed that there was no statistically significant difference in the lung compliance among survivors and non-survivors of ARDS. Changes in the tidal volume, inspiratory flow rates, and level of PEEP can improve compliance.

In this study all the non-survivors had more than one non-pulmonary organ dysfunction. In the survivors the mean number of non-pulmonary organs in failure was 2.75 ± 1.61 and in non-survivors it was 3.87 ± 1.36 . Unpaired t-test was done and the one-tailed p value was found to be 0.0092 which is statistically significant. Villar et al.²⁹ observed that more the number of failing organs, the greater was the mortality in ARDS patients. Suchyta et al. also observed similar findings.²⁵

In this study the percentage of patients with sepsis (pulmonary and non-pulmonary) at presentation was 36.4% (16 out of 44 patients). Out of the non-survivors 54% patients with sepsis died, which was found to be twice more than patients without sepsis (Relative risk 2.1 with 95% CI 1.2 to 3.5; $p = 0.011$). Montgomery et al. in a prospective study reported that majority of late deaths were related to sepsis, and 73% of those who died after 3 days met criteria for sepsis syndrome.³² Suchyta et al. also reported similar findings.²⁵

CONCLUSION

ARDS is associated with several clinical conditions ranging from trauma to sepsis. Non-survivors have lower oxygenation ratio at presentation and more number of organ dysfunction. Sepsis was associated with the highest number of deaths.

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Declarations:

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REFERENCES

1. Ashbaugh DG, Bigelow DB, Petty TL, Levine BE. Acute respiratory distress in adult. *Lancet* 1967;2:319-323.
2. Matthay MA, Martin TR. Pulmonary edema and acute lung injury. In: *Textbook Of Respiratory Medicine* edited by Mason RJ, Broaddus VC, Martin TR et al. 5th ed. Philadelphia: Saunders; 2010. p. 1283-1325.
3. Dreyfuss D, Saumon G. Role of tidal volume, FRC, and end-inspiratory volume in the development of pulmonary edema following mechanical ventilation. *Am Rev Respir Dis* 1993;148:1194-1203.
4. Ranieri VM, Suter PM, Tortorella C, De Tullio R, Dayer JM, Brienza A et al. Effect of mechanical ventilation on inflammatory mediators in patients with acute respiratory distress syndrome: a randomized controlled trial. *JAMA* 1999;282(1): 54-61.
5. Artigas A, Bernard GR, Carlet J, Dreyfuss D, Gattinoni L, Hudson L, et al. The American-European Consensus Conference on ARDS, Part 2. *Am J Respir Crit Care Med* 1988;157(4):1332-1347.
6. Eisner MD, Thompson T, Hudson LD, Luce JM, Hayden D, Schoenfeld D, et al. Efficacy of Low Tidal Volume Ventilation in Patients with Different Clinical Risk Factors for Acute Lung Injury and the Acute Respiratory Distress Syndrome. *Am J Respir Crit Care Med* 2001;164(2):231-236.
7. Rubenfeld GD, Caldwell E, Peabody E, Weaver J, Martin DP, Neff M, et al. Incidence and Outcomes of Acute Lung Injury. *N Engl J Med* 2005;353(16):1685-1693.
8. Goss CH, Brower RG, Hudson LD, Rubenfeld GD. ARDS Network. Incidence of acute lung injury in the United States. *Crit Care Med* 2003;31(6):1607-1611.
9. Luhr OW, Antonsen K, Karlson M. Incidence and mortality after acute respiratory failure and acute respiratory distress syndrome in Sweden, Denmark, and Iceland. *Am J Respir Crit Care Med* 1999;159:1849-1861.
10. Bersten AD, Edibam C, Hunt T, Moran J. Incidence and mortality of acute lung injury and the acute respiratory distress syndrome in three Australian states. *Am J Respir Crit Care Med* 2002;165(4):443-448.
11. Murray JF, Matthay MA, Luce JM, Flick MR. An expanded definition of the adult respiratory distress syndrome. *Am Rev Respir Dis* 1988;138:720-723.
12. Bernard GR, Artigas A, Brigham KL, Carlet J, Falke K, Hudson L. The American-European Consensus Conference on ARDS. *Am J Respir Crit Care Med* 1994 March;149(3):818-824.
13. Ranieri VM, Rubenfeld GD, Thompson BT, Ferguson ND, Caldwell E, Fan E, Camporota L, Slutsky AS. Acute respiratory distress syndrome: the Berlin definition. *JAMA* 2012;307(23):2526-2533.
14. Martin C, Papazian L, Payan MJ, et al. Pulmonary fibrosis correlates with outcome in adult respiratory distress syndrome. *Chest* 1995;107(1):196-200.
15. Puybasset L, Cluzel P, Gusman P, Grenier P, Preteux F, Rouby JJ. Regional distribution of gas and tissue in acute respiratory distress syndrome. *Intensive Care Med* 2000;26(7):857-869.
16. Gattinoni L, D'Andrea L, Pelosi P. Regional effects and mechanism of positive end-expiratory pressure in early adult respiratory distress syndrome. *JAMA* 1993;269:2122-2127.
17. Pelosi P, Cereda M, Foti G. Alterations of lung and chest wall mechanics in patients with acute lung injury: Effects of positive end-expiratory pressure. *Am J Respir Crit Care Med* 1995;152:531-537.
18. Wright PE, Bernard GR. The role of airflow resistance in patients with the adult respiratory distress syndrome. *Am Rev Respir Dis* 1989;139(5):1169-1174.
19. Amato MBP, Barbas CSV, Medeiros DM, Magaldi RB, Schettino GP, Lorenzi-Filho G. Effect of a Protective-Ventilation Strategy on Mortality in the Acute Respiratory Distress Syndrome. *N Engl J Med* 1998;338(6):347-354.
20. Goyal M, Houseman D, Johnson NJ, Christie J, Mikkelsen ME, Gaieski DF. Prevalence of Acute Lung Injury Among Medical Patients in the Emergency Department. *Acad Emerg Med* 2012;19(9):E1011-E8.
21. Elie-Turenne MC, Hou PC, Mitani A, Barry JM, Kao EY, Cohen JE, Frenzl G, Gajic O, Gentile NT. Lung injury prediction score for the emergency department. *Int J Emerg Med* 2012;5(1):33.
22. Gajic O, Dabbagh O, Park PK, Adesanya A, Chang SY, Hou P. Early Identification of Patients at Risk of Acute Lung Injury. *Am J Respir Crit Care Med* 2011;183(4):462-470.

23. Bhadade RR, de Souza RA, Harde MJ, Khot A. Clinical characteristics and outcomes of patients with acute lung injury and ARDS. *J Postgrad Med* 2011;57(4):286-90.
 24. Rubenfeld GD, Caldwell E, Peabody E, Weaver J, Martin DP, Neff M. Incidence and Outcomes of Acute Lung Injury. *N Engl J Med* 2005;353(16):1685-1693.
 25. Suchyta MR, Clemmer TP, Elliott CG, Orme JF Jr, Weaver LK. The adult respiratory distress syndrome. A report of survival and modifying factors. *Chest* 1992;101(4):1074-1079.
 26. Singh G, Gladdy G, Chandy TT, Sen N. Incidence and outcome of acute lung injury and acute respiratory distress syndrome in the surgical intensive care unit. *Indian J Crit Care Med* 2014;18:659-665.
 27. Agarwal R, Aggarwal AN, Gupta D, Behera D, Jindal SK. Etiology and outcomes of pulmonary and extrapulmonary acute lung injury/ARDS in a respiratory ICU in North India. *Chest* 2006;130(3):724-729.
 28. Erickson SE, Martin GS, Davis JL. Recent trends in acute lung injury mortality: 1996–2005. *Crit Care Med* 2009;37(5):1574-1579.
 29. Villar J, Blanco J, Añón J, Santos-Bouza A, Blanch L, Ambrós A. The ALIEN study: incidence and outcome of acute respiratory distress syndrome in the era of lung protective ventilation. *Intensive Care Med* 2011;37(12):1932-1941.
 30. Esteban A, Anzueto A, Frutos F. Characteristics and Outcomes in Adult Patients Receiving Mechanical Ventilation: A 28-Day International Study. *JAMA* 2002;287(3):345-355.
 31. Kangelaris KN, Calfee CS, May AK, Zhuo H, Matthay MA, Ware LB. Is there still a role for the lung injury score in the era of the Berlin definition ARDS? *Annals of Intensive Care* 2014;4:4.
 32. Montgomery AB, Stager MA, Carrico CJ, Hudson LD. Causes of mortality in patients with the adult respiratory distress syndrome. *Am Rev Respir Dis* 1985;132(4):485-489.
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ORIGINAL PAPER

Role of Paperless Partograph in Monitoring Primiparous and Multiparous Labour

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ABSTRACT

A hospital based prospective study was conducted to determine the role of paperless partograph in monitoring primiparous and multiparous labour by comparing with the WHO Modified partograph. The course of labour in 400(200 primiparous and 200 multiparous) women with term, singleton pregnancies with vertex presentation in labour without any complications was studied by using either partographs in groups of 200 (100 primiparous and 100 multiparous) and the labour outcome of primiparous and multiparous compared. The rate of caesarean section was 9% primiparous and 13% multiparous monitored by Paperless partograph as against 9% primiparous and 12% multiparous of the WHO one. Augmentation was required in 8% primiparous and 5% multiparous cases subjected to the Paperless partograph which was comparable to the WHO Modified partograph. The labour Paperless partograph was similar to the WHO Modified partograph in monitoring primiparous and multiparous labour as an effective means to prevent prolonged labour and its sequel.

Keywords: *Prospective studies, caesarean section, labour, pregnancy*

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INTRODUCTION

The partogram is a chart of cervical dilation during labor. Friedman first described it in the 1950s.⁸ and thereafter completed by the concept of alert and action lines by Philpott and Castle.⁹

Prolonged and obstructed labour is one of the major causes of maternal and perinatal mortality and morbidity worldwide. Around 42000 or 8% of all maternal deaths in the year 2000 were attributed to prolonged labour. In India 5% of the total maternal deaths are caused by prolonged labour and obstructed labour.¹

Moreover prolonged labour is associated with significant maternal morbidity due to sepsis, post partum hemorrhage, ruptured uterus and urinary fistula. Again prolonged and obstructed labour is also a major precedent of perinatal deaths, birth asphyxia and neonatal sepsis. Early detection of abnormal labour and timely intervention to prevent prolonged labour can reduce the sequel of obstructed labour, postpartum hemorrhage and sepsis and thus result in better labour outcomes. The partograph which is a graphical representation of the various events of labour and salient features of mother and father plotted against time serves to be an effective tool to monitor labour. Use of WHO partograph facilitates early recognition of any deviation from normal labour and thereby aids appropriate intervention like amniotomy, oxytocin induction and also caesarean section. It serves to be an early warning system for all health professionals including doctors, midwives and traditional birth attendants and assists in early decision on transfer, augmentation and termination of labour. Yet the WHO partograph is not used widespread in low resource areas. Dr. A. K. Debda argues that the present WHO partograph is not adapted to local needs, is not acceptable to those who use it and cannot be used given the available resources. Dr. Debda has proposed

a new, low-skill and graphless method for preventing prolonged labour- the Paperless partograph². In this study we have tried to evaluate the impact of use of Paperless partograph in labour outcomes of primiparous and multiparous women.

MATERIALS AND METHODS

The present study was undertaken at the tertiary hospital of Gauhati Medical College and Hospital (GMCH), Assam, between 1.05.2014 to 30.04.2015. The study was an observational study. Ethical clearance was obtained from the Institutional Ethics committee and the participants were included after an informed and written consent.

In our study 400 (200 nulliparas and 200 multiparous) women attending the labour room was included on the basis of the following inclusion and exclusion criteria.

Inclusion criteria: Woman with term singleton pregnancies with vertex presentation in spontaneous labour without any complications.

Exclusion criteria:

- Woman with obstetric complications like preterm labour, previous caesarean section post dated pregnancy, cephalopelvic disproportion, ante partum haemorrhage, severe pre eclampsia/ eclampsia, malpresentations, multiple pregnancy, foetal distress, intrauterine foetal death, intrauterine growth retardation (IUGR), premature rupture of membranes (PROM) etc.
- Woman with medical complications like anaemia, hypertension, diabetes and immuno compromised states

Patients fulfilling the inclusion criteria and those willing to participate were randomly divided (100 primiparous and 100 multiparous) into two groups – Group A and Group B. WHO Modified partograph was used in Group A and Paperless partograph was used in Group B respectively to monitor labour. . The following protocol was followed-

- The plotting was started when cervical declaration was 4 cms.
- Four hourly per vaginal examination was done but could be performed earlier if indicated.
- If delivery is not achieved by Alert line/ Alert ETD the case is re-evaluated and appropriate decision taken for augmentation, transfer or termination of pregnancies.
- If delivery does not occur by Action line/ Action ETD, the patient is at risk of prolonged labour and termination is planned by appropriate medical or surgical intervention.

RESULTS AND OBSERVATIONS

The mean age was 23 ± 3.6 years for primiparous and the 26 ± 3.2 years for multiparous patients. The average gestational age was 37.6 ± 1.04 weeks in primiparous and 37.7 ± 0.78 weeks in multiparous (**Table 1** and **Figure 1**). The early age of marriage and pregnancy explains the reason for low mean age of primiparous and multiparous. The pulse and blood pressure of both primiparous and multiparous were within the normal range. The average uterine contractions were 2.7 ± 1.06 / 10 mins for primiparous and 2.74 ± 1.16 / 10 mins for multiparous which implied that they were in active labour.

Table 1 Baseline characteristics of study Population

Variable	Range	Mean \pm SD	
		Primiparous	Multiparous
Age (years)	17-36	23 ± 3.6	26 ± 3.2
Nutritional status (BMI Kg/m ²)	16-31	24.17 ± 3.6	25.4 ± 3.4
Gestational age (weeks)	37-41	37.6 ± 1.04	37.7 ± 0.78
Pulse (beats /min)	60-90	72.5 ± 4.48	72.6 ± 3.73
Systolic BP (mm Hg)	90-120	108.5 ± 9.5	107.5 ± 8.9
Diastolic BP (mm Hg)	60-90	75.9 ± 9.2	77.1 ± 8.9
Uterine contractions /10 mins	1-5	2.7 ± 1.06	2.74 ± 1.16

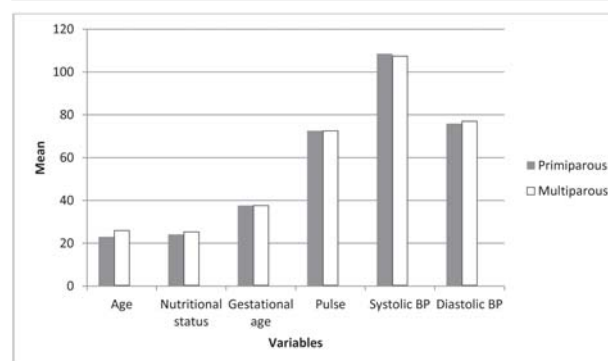


Figure 1 Baseline characteristics of study Population

In our study it was found that most of the cases delivered before reaching the alert line/alert ETD. 79% primiparous and 85% multiparous in group A delivered within alert line as against 84% primiparous and 85% multiparous of group B who delivered within alert ETD. Again 14% primiparous and 13% multiparous monitored by the WHO Modified partograph delivered between the alert and action line in group A while 13% of primiparous and 14%

multiparous delivered between alert and action ETD in group B. Only a small proportion of 7% primiparous and 2% multiparous of group A crossed the action line while 3% primiparous and 1% multiparous monitored in group B delivered beyond the action ETD. Another aspect seen in our study was that augmentation was required in 13% of primiparous and 8% of multiparous monitored by the WHO Modified partograph while 8% of primiparous and 5% of multiparous monitored by Paperless partograph required augmentation (**Table 2**). There was no statistical significant difference between the two. Thus course of labour with Paperless partograph in both primiparous and multiparous was comparable with that of WHO modified partograph.

Table 2 Type of labour in relation to alert line/alert ETD and action line/action ETD

Type of labour		Group A (WHO Modified)	Group B (Paperless)	p
Labour within alert line/alert ETD	Primiparous	79	84	0.3
	Multiparous	85	85	1
Labour between alert line/ alert ETD and action line/ action ETD	Primiparous	14	13	0.8
	Multiparous	13	14	0.8
Labour crossing action line/action ETD	Primiparous	7	3	0.2
	Multiparous	2	1	0.56
Augmentation of labour	Primiparous	13	8	0.26
	Multiparous	8	5	0.39

In the present study (**Table 3**) it was seen that 84% of primiparous and 86% of multiparous monitored by the WHO Modified partograph delivered spontaneously which was similar to those monitored by the Paperless partograph. Again 7% primiparous and 2% multiparous were delivered by assisted vaginal delivery as against 9% primiparous and 3% multiparous of group B. 9% of primiparous and 12% multiparous cases monitored by the WHO Modified partograph needed caesarean section while 9% primiparous and 13% multiparous subjected to Paperless partograph required caesarean section. There was however no statistical difference between the two groups in regards to mode of delivery.

Table 3 Labour outcome with either partograph

Mode of delivery		Group A (WHO Modified)	Group B (Paperless)	p
Spontaneous delivery	Primiparous	84	82	0.7
	Multiparous	86	84	0.6
Assisted Vaginal delivery	Primiparous	7	9	0.6
	Multiparous	2	3	0.6
Caesarean section	Primiparous	9	9	1
	Multiparous	12	13	0.8

DISCUSSION

Prolonged and obstructed labour is one of the easily preventable causes of maternal mortality. Early detection of abnormal labour through partograph serves to be an efficient measure to reduce the incidences of prolonged labour and its sequel. The Paperless partograph was devised by Dr. Debidas in a simple and graphless manner to monitor labour and aid in appropriate decision making. In this context the present study was conducted to determine the labour outcome of the Paperless partograph in primiparous and multiparous women by comparing it with the WHO Modified one.

In the present study we found that most of the cases followed a normal course of labour and delivered before the alert line/ alert ETD without any undue intervention. 79 % of primiparous and 85 % of multiparous monitored by the WHO Modified partograph delivered within the alert line. Again 84 % primiparous and 85% multiparous subjected to Paperless partograph delivered within the alert ETD. This was in concordance with the study conducted by Dr. Prakash et al in 2014 in Odisha where 75.5% of primigravida and 90.7% of multigravida monitored with the Paperless partograph delivered before the alert ETD.³

Only 14% of primiparous and 13% of multiparous monitored by the WHO Modified partograph crossed the alert line while 13% of primiparous and 14% of multiparous cases monitored by Paperless partograph crossed the alert ETD. A minor proportion i.e. 7% primiparous and 2% multiparous monitored by the WHO Modified partograph crossed the action line. They were reassessed and terminated accordingly. Similarly only 3% primiparous and 1% multiparous cases subjected to the Paperless partograph crossed the action ETD. However they were delivered within appropriate time so that none of them progressed to obstructed labour. Almost similar results were seen in a study conducted by Dr. Deblina et al in 2013 in Bankura Medical College, West Bengal where it was observed that 14.5% cases monitored by the Paperless partograph delivered between alert and action

ETD and only 1.8% beyond the action ETD.⁴

The rate of spontaneous deliveries in our study was 84% primiparous and 86% multiparous women in group A and 82% primiparous and 84% multiparous in group B respectively. Similar results were also observed by Dr. Krishna Lingegowda in his study on comparison between WHO and Paperless partograph conducted in PESIMSR, Kuppam in 2014 where 44% cases monitored by WHO partograph and 74% cases monitored by Paperless partograph had a spontaneous delivery.⁵

Augmentation of labour was required with only 13% primiparous and 8% multiparous in group A as against 8% primiparous and 5% multiparous of group B in our study. Another important aspect was that 9% of primiparous and 12% of multiparous women monitored by the WHO Modified partograph required a caesarean section while 9% of primiparous and 13% of multiparous labour observed by the Paperless partograph required caesarean section. A study by Kiran Agarwal et al in Uttar Pradesh observed a rate 13% augmentation of labour and 1% of caesarean sections with the Paperless partograph.⁵

Another study conducted by Entesar Fatouh et al in Egypt from 1st March to last of August 2014 observed a CS rate of 23.1% with the Paperless partograph.^{6, 7}

From our results we found that primiparous and multiparous women monitored by the Paperless partograph had similar labour outcomes as those monitored by the WHO Modified partograph. It is seen that the Paperless partograph is as effective as the WHO Modified partograph in management of labour. Thus the use of Paperless partograph holds great promises as a simple tool for monitoring labour and preventing prolonged labour and its sequel.

Using the Alert and Action ETD was found convenient to derive appropriate measures for the outcome of labor. So, the paperless partogram is a simplified method to manage the active stage of labor that needs advocacy among caregivers, mostly in low-skilled and/or staffed settings.¹⁰

CONCLUSION

Prolonged labour accounts for nearly 5% of the causes of maternal mortality in India.¹ These maternal deaths are easily preventable if we can identify any deviation of normal labour at the earliest and initiate prompt measures. The WHO Modified partograph have been a time tested and effective measure for appropriate monitoring and management of labour. However the Paperless partograph devised by Dr. Debdas was found to be as effective as the WHO Modified partograph in monitoring both primiparous and multiparous labour. From our study we can conclude that the Paperless partograph has great

prospects to prevent prolong labour as it is more simpler, less time consuming without any graph and has similar labour outcomes as the WHO Modified partograph.

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REFERENCES

1. World Health Organization. Trends in Maternal Mortality:1990 to 2013 – estimates by WHO, UNICEF, UNFPA, The World Bank and the United Nations Population Division. World Health Organization; 2014.
2. Debdas AK. Paperless Partogram. 41st Annual Scientific Session 2008; Sri Lanka college of Obstetrics and Gynaecologists. SLJOG 2008;30(1):124.
3. Mishra P, Nayak L. ETD-Expected Time of Delivery- A New Simple Clinical Tool for Management of Labour. AICOG Chennai. 2014.
4. Roy D, Dey R. ETD- Expected Time Of Delivery- A New Simple Clinical Tool For Management Of Labour. AICOG Patna. 2014:2.
5. Lingegowda K, Bhuvaneswari, Shailaja N, Kulkarni N, Bhatt SB, Vimala. Comparison of WHO partograph with Paperless partograph in the management of labour and to determine which is more use friendly; AICOG Patna 2014:106-7.
6. Agarwal K, Agarwal L, Agarwal VK, Agarwal A, Sharma M. Evaluation of Paperless Partogram as a Bedside Tool in the Management of Labor. J Family Med Prim Care 2013;2(1):47-9.
7. Fatouh E, Ramadan S. Effect of using Paperless Partogram on the Management and Outcome of Labour and the Nurses' Opinion. Journal of Education and Practice 2015;6(8):17-23.
8. Friedman, E.A. (1955) Primigravid Labour. A Graphicostatistical Analysis. *Obstetrics and Gynecology*, 6, 567-589.
9. Philpott, R.H. and Castle, W.M. (1972) Cervicographs in the Management of Labour in Primigravidae. *International Journal of Obstetrics and Gynecology*, 79, 592-598.
10. NFB Tandu-Umba, G Kalombo Muamba. Using Alert and Action Expected Times of Delivery in Prevention of Prolonged Labor. Open Journal of Obstetrics and Gynecology 2015;5:813-818.

ORIGINAL PAPER

Role of Tila Taila as Sneha Abhyanga in Sandhigatavat in Relation to Pain to Prove the Theory “Snehat Vatam Samayati”

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ABSTRACT

Ayurveda, the science of life aims to preserve the positive health of a healthy person and to cure the diseases. In Ayurveda treatment is based on two siddhantas only- samanya siddhanta and vishesh siddhanta. Out of these, guna vishesh siddhanta, which is related to opposite guna, was taken to see the role of tila taila as sneha Abhyanga (external massage) in Osteo-arthritis (Sandhigatavat) in relation to pain and prove the theory “Snehat Vatam Smayati”. Total no of 30 patients of Sandhigatavata (OA), age 40-70 years were selected randomly from out patient department (OPD) and in patient department (IPD) of Govt. Ayurvedic College & Hospital (GAC&H) at a ration of 1:1 for this study. Results were observed weekly and after 21 days of the trial period and datas are statistically analysed using Student's T-test. P value ≤ 0.05 , considered as statistically significant. Results depicts that pain before treatment mean \pm SD was 2.03 ± 0.718 and after treatment declined to 0.87 ± 0.571 $P(\leq 0.001)$. It showed a statistically high significant result corresponding to indication of a highly effective intervention of Til Taila for decrease in the symptom of pain in Sandhigatavata (OA). This study may be used as a pedestal for further sophisticated studies.

Keywords : Sandhigatavata, Abhyanga, Snehana, Tila taila, Guna, Siddhanta

INTRODUCTION

Ayurveda, the science of life, can give adequate healthy and happiness to the human body as supports.^{1,2} The present work has undergone a clinical and demographic study to establish the effectiveness of sneha (tila) abhyanga (external massage) in a group of 30 patients for management of sandhigatavata (Osteo-arthritis). Every system of the human malady are carefully studied by our ancient Acharyas and clearly defined the Sandhigatavata and its disorder among the eighty types of vata vyadhi.³ In Ayurveda, Sandhi has been mentioned as the root of Majjabaha srota. It is composed of Prithivi, Akash and Jala mahabhuta.⁴ In equilibrium state, the three somatic humours like vata, pitta and kapha, conduct and control all the structures and functions of the body. But only vata is capable for mobility and is the force to keep dhatu and malas in equilibrium. Among the disorders pertaining to particular age groups, sandhigatavata is a type of degenerative and articular joint disorder which affects mainly the weight bearing joints in advancing age when kupita vayu gets involved.^{5,6} Charaka (1000 B.C.), Susruta

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(500 B.C.) and Bhagbhata 400 B.C) are the pioneer in the field of Indian medicine. Although they have not described sandhigataavata in detail, but the principles of diseases of joints have been enumerated. The clinical features of Sandhigataavata described in Ayurvedic texts are very similar to the clinical entity of Osteo-arthritis. It is also seen in the lower socio-economic group associated with cold, damp climate.⁷ Sandhigataavata has been designated in Ayurveda as a Tridosaja vyadhi with predominance of vata. The indulging dietary habits vitiate vayu and obstruct the “sleshak kapha” within the sandhis. As a result it produces pain, swelling, stiffness, tenderness, muscular wasting of the joints leading to impaired movement of the limbs.⁸ So Charaka has given the clinical presentation of sandhigataavata like ‘Vatapurnadritisparsha sotha sa sandhigate anila’ (if vayu gets located in joint swelling occurs like air filled bag in touch) & ‘Akunanaprasarana sabedana’ (pain during contraction and extension).

The diseases caused by vata dosha can be pacified with opposite guna of vata dosha like Snigdha, Ushna, Guru, Sthula, Sthira, Picchila and Slakshna as per gunavishesh siddhanta described in classics.⁹

OBJECTIVE

To see the effect of Snehana (Til taila) as Abhyanga karma in patients of sandhigataavata in relation to pain as symptomatic relief.

MATERIAL AND METHOD

It was a hospital based observational study in the period from 2012- 2013. A total number of 30 Clinically and radiologically diagnosed patients of sandhigataavata (OA) were selected in the age group of 40-70 years in a ratio of 1:1 from O.P.D. and I.P.D. of GAC & H, Jalukbari, Guwhati-14, Assam. Random sample technique was used. Informed consent was taken from patients. Patients who were unwilling to participate in the study and seriously ill patients were excluded from the study. Outcome were evaluated after application of trial drug weekly for 3 weeks. Data analysis were done and graphically represented using bar diagram and pareto plot.^{10, 11}

Assessment of severity of the disease (Pain) was done by following:

Table 1 Grading of severity

Sign and Symptoms (Severity)	Grade (gr)
Absent	0
Mild	1
Moderate	2
Severe	3

Table 2 Gunas of provoked vata dosha in terms of clinical features

Guna of vata	Symptoms	Before Treatment Severity Grades	After Treatment Severity Grades		
			FU-1	FU-2	FU-3
Ruksha	Atopa (Cracking Sound)				
Khara					
Sheeta	Sula (Pain)				
	Stambha (Stiffness)				
	Sotha (Swelling)				
Laghu	Laghuta (Wasting)				
Chala	Prasaranakun- chanasa vedana (Restricted Movement)				

During examination the classical description found in Brihatrayee and Madhav Nidan is applied. The signs and symptoms described in samhitas which get provoked by the respective gunas of kupita vata in sandhi according to Ayurvedic literary concept were used.

Preparation and selection of the trial drug:

Preparation of trial drug from crude drugs was done using standard protocols¹² in the State Ayurvedic Pharmacy (Rasasala dept.), Govt. Ayurvedic College.

Time of Abhyanga:

- Morning after sunrise, in a circular motion on the affected joint for 15 minutes (with his/her right hand).
- At night before bed, in a circular motion on the affected joint for 15 minutes (with his/her right hand).

RESULTS AND OBSERVATIONS

The results and observations of the present study are presented as follows:

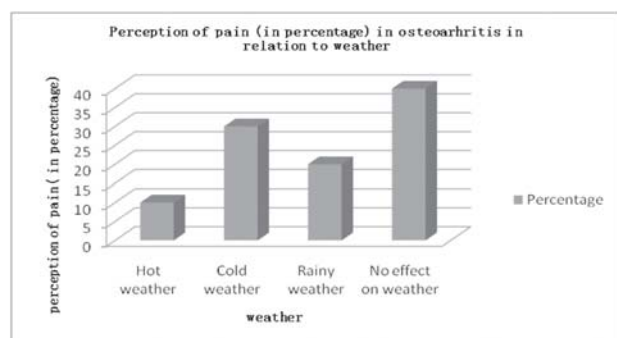


Figure 1 Perception of pain (in percentage) in relation to weather

Aggravation of pain maximum number of patients have no effect on weather which is 12(40%) followed by effect of cold weather 9(30%), rainy weather 6(20%) and a minimum number of patients 3(10%) feel more pain in hot weather which is evident in **Figure 1**.

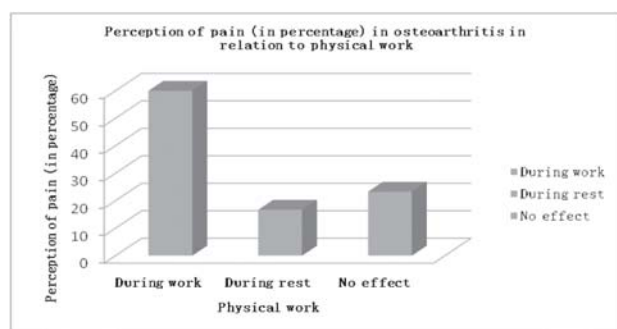


Figure 2 Perception of pain (in percentage) in relation to physical work

Maximum number of patients feel more pain during work 18(60%) followed by no effect 7(23.3) and during rest 5 (16.7) which is evident in **Figure 2**.

Figure 3 depicts that before treatment, 7 patients were in grade 1, 15 were in grade 2 and 8 were in grade 3. Whereas after treatment the number of patients were found to be 7 in grade 0, 20 in grade 1 and 3 in grade 2.

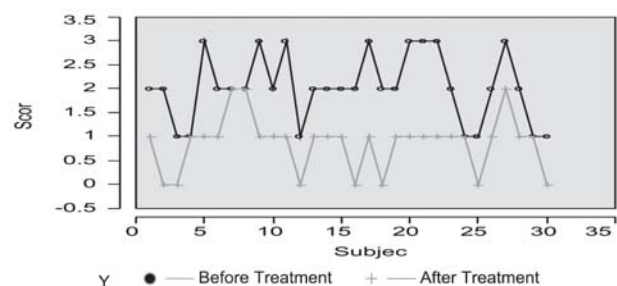


Figure 3 Effect of Til Taila on diagnosed patients of sandhigatavata (OA) before and after treatment representing In a Pareto Plot

Table 3 Effect of Trial Drug on pain

	Before Treatment	After Treatment	Correlation	P Value	Paired Differences		t	P Value
					Mean	SD		
Mean	2.03	0.87	0.43*	0.017	1.17	0.70	9.14**	<0.001
±S.D.	0.718	0.571						

Significant at $P(<0.05)$ **Significant at $P(<0.01)$

Table 3 depicts that pain before treatment mean±SD was 2.03 ± 0.718 which after 21 days of treatment declined to 0.87 ± 0.571 $P(<0.001)$. It showed a statistically high significant result corresponding to indication of a highly effective intervention for decrease in the symptom pain.

DISCUSSION

Studies on the treatment of Sandhigatavata (Osteoarthritis) with til oil abhyanga on the basis of guna vishesh siddhanta have been forwarded by many research workers. Observations suggests that, as a sneha dravya, Til taila (sneha) have a significant effect in pacification of vitiated vata related to pain due to having opposite qualities of vata like Drava, Suksma, Sara, Snigdha, Picchil, Guru, Sitala, Manda, and Mridu, as Charaka mentioned in classics. In pain before treatment the mean was 2.03 and SD was 0.0718 which is declined to mean 0.87 and SD 0.571 and the p value is <0.001 which shows a highly statistically significant result. So the intervention is highly effective for decrease the pain symptom. Renter E stated, significant difference in pain intensity between the two groups ($P = 0.004$) after treatment. The study showed a positive effect of sesame oil in improving clinical signs and symptoms in patients with knee OA and indicated the fact that sesame oil might be a viable adjunctive therapy in treating OA.¹³ Colleen M. A. Stated the sesame group experienced the largest drop in pain intensity from 9.5 before treatment to 3.5 after treatment. The control group experienced a drop from 9 before treatment to 7 after.¹⁴ Hsu D Z., Chu P. Y. and Jou I .M. Daily sesame oil treatment for 7 days significantly decreased OA-associated joint pain.¹⁵ The trial drug Tila taila is clinically and statistically established as effective for the treatment of Sandhigatavata without having any side effect and toxicity.^{12,16,17} Correlation between the before treatment and after treatment of pain shows the significance value of 0.017 which also shows the significant value. So it suggests that there is a relationship between pre and post test which reject H_0 : Reject H_0 if $P < t_a$ when $t_a = t_{0.05}$

setting the level of confidence at 95% probability signifying that if the differences is significant at the level of $P < 0.05$, the hypothesis will be rejected establishing the term “snehat vatam samayati.” The present study is in continuity with other studies done across the countries.

CONCLUSION

Ayurveda has its own philosophy with unique approach. The present study revealed that the clinical improvement of pain of sandhigata vata (OA) with the application of a vata samka aushadhi, i.e. Tila taila as taila abhyanga. Further studies are required with bigger sample size to substantiate the evidence. Here the guna of vata that affect on the body tissue was converted to the clinical features. In future if any device is discovered to measure the effect of guna in the body then it will help more to the further researchers to be a pioneer study.

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Ethical clearance: Taken.

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Conflict of Interest: Non declared.

Contribution of Authors: We declare that this work was done by authors named in this article and all liabilities pertaining to claims relating to the content of this article will be done by the authors.

REFERENCES

1. Dwarakanatha C. Introduction to Kayachikitsa. Varanasi: Chaukhamba Oriental Publishers; 2000. p. 29. vol 1.
2. Manual on Geriatric Health Care Through Ayurveda. Central Council for Research in Ayurveda and Siddha, Dept. Of AYUSH, Ministry of Health and Family Welfare, Govt. of India. 1998. p. 32.
3. Kashinath S, Chaturvedi GC. Samhita of Agnivesa. Chaukhamba Bharati Academy Publisher; 2002. p. 783.
4. Siva K. G. Ayurvediya Sharira Kriya Vijnanam. 18th ed. Sri Prakashan Publisher; 2001. p. 103.
5. Shastri K A D. Sushruta Samhita. 1st ed. Varanasi: Pub Choukhamba Sanskrit Series; 2007. p. 228.
6. Das C K. Select Research Papers on Ayurveda and Siddha Geriatrics. Central Council for Research in Ayurveda and Siddha, Dept. of AYUSH, Ministry of Health and Family Welfare Govt. of India; 2010. p. 15. vol 1.
7. Haslett C, Edwin R, Chilvers, Hunter J. A.A, Boon N A. Davidson's Principles & Practice of Medicine. Churchill Livingstone; 1999. p. 8-12.
8. Upadhyaya Y. Madhavakara Madhav Nidanam with Madhukosha Commentary. Varanasi: Chaukhamba Prakashan; 1989. p. 134.
9. Gupta K A. Vagbhatta Astanga Hridaya. 12thed. Varanasi: Chaukhamba Prakashan; 1993. p. 34.
10. Mahajan B. K. Methods in Biostatistics for Medical Students and Research Workers. 7th ed. Jaypee Brothers; 2014. p. 80-95.
11. Sengupta N, Sengupta B. Jalpa Kalpa Taru Vyakhya: Charaka Samhita. 2nd ed. Varanasi: Chaukhamba publishers; 2002. p. 122; vol 3.
12. Reddy KRC. Bhaisajya Kalpana Vijnanam. 19th ed. Varanasi: Chaukhamba Sanskrit Bhawan; 2006. p. 373.
13. Colleen M. Knee arthritis pain? Try this food—study shows it works. Regrade Health. 2013;17-19.
14. Renter E. Sesame Seeds May Compete With Conventional Knee Arthritis Drug Treatments. The Natural Society Natural Health. 2013;7-8.
15. Hsu D Z. Chu P.Y. and Jou I.M. Department of Orthopedics. National Cheng Kung University Hospital . Tainan: Taiwan. Enteral sesame oil therapeutically relieves disease severity in rat experimental osteoarthritis. Food and Nutrition Research. 2016;60:38-42.
16. Kasturi K. R. Database Medicinal Plants used in Ayurveda. 35 Ayurvediya Panchakarma Vigyan. Sri Vaidyanath Ayurveda Bhawan; 2007. p. 303.
17. Sharma P.V. Dravyaguna Vijnana. 16th ed. Varanasi: Chaukhamba Sanskrit Sansthan; 1998. p. 120-3. vol 2.

ORIGINAL PAPER

A Study on 'Sero-prevalence of Rubella in Pregnancy' Giving Special Emphasis to its Clinical Presentation

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ABSTRACT

Rubella is one of the frequent causes of intra-uterine acquired infection in females. The present study was under taken with a purpose to study the sero-prevalence of rubella in pregnant woman and to examine its relation with socio-economic status. The present study was carried for a duration of one year taking up a total of 81 pregnant women admitted or attending the outdoors of Obstetrics and Gynaecology departments in Gauhati Medical College & Hospital, Guwahati, having different ethnic backgrounds, after approval of the Institutional Ethical Committee. Among the total of 81 samples, sero-positivity of rubella virus was seen using IgG as the serological marker. The cases were studied in three age groups as '21-30' years, '31-40' years and '16-20' years. Six type of clinical presentations were taken for the study as "pre term labour", "bleeding per vagina", "still birth", "spontaneous abortion", "intra uterine growth retardation" and "asymptomatic". The clinical presentation of the study group was evaluated. The data recorded was analysed statistically using Student's T-test. P value ≤ 0.05 is considered as statistically significant. Such a study may be useful in prevention and treatment of rubella virus.

Keywords: Rubella, Sero-positive, Clinical presentation

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INTRODUCTION

Rubella or German measles is a exanthematous fever characterized by transient macular rash and lymphadenopathy. In itself, the disease is trivial but rubella in the pregnant woman may lead to congenital malformation in the baby.¹ But in the world, half a million pregnant women die each year, many from such infection. Rubella virus infection acquires a special significance in pregnant women as the virus may enter the fetal circulation through the placenta.² Unfavourable outcome to pregnancy has become a serious problem in the society. Rubella virus infection during pregnancy can be a serious threat to the fetus with possible loss of pregnancy and diseases of newborn of which, encephalitis, hepatomegaly, neuritis, orchitis, thrombocytopenic purpura are the hallmarks of infection. Infection during pregnancy has been documented since the writings of Hippocrates. Obstetrics practice in western world does not reflect what happens elsewhere.³ The infection is transmitted during passage through contaminated uterine cervix during birth, by transplacental transmission, from human milk by breast feeding or from banked milk, transmitted from other children in the newborn nursery and in day-care centers, transmitted through blood, through sexual contacts and through contacts with urine and other body secretions like saliva, semen etc.⁴ Primary maternal rubella infection during the first semester of pregnancy causes high risk for the development of congenital rubella with malformations of heads, eye and ear.^{5,6,7,8,9,10,11}

OBJECTIVES

1. To study sero-prevalence of rubella in different ages of pregnant female.

- To find out whether there is any co-relationship of sero-positive rubella cases with different clinical presentation.

MATERIALS AND METHODS

Materials: 5 ml of venous blood was collected aseptically in a sterile vial. The vial was left at room temperature and the blood was allowed to clot. The serum was separated by centrifuging the whole blood in a centrifuge machine at 3,000 revolutions per minute for 5 minutes. The separated serum was then transferred to a sterile vial, labelled and stored at 2 degree to 8 degree centigrade till the assay was done. The serum was separated by centrifuging the whole blood in a centrifuge machine at 3,000 revolutions per minute for 5 minutes. The separated serum was then transferred to a sterile vial, labelled and stored at 2 degree to 8 degree centigrade till the assay was done. Serum samples were tested by Enzyme Linked Immuno Sorbent Assay for IgG to rubella virus using the commercially available kit (NOVATEC IMMUNDIAGNOSTICA GMBH) manufactured by Germany with lot no.RUBG-013.

Method: The present study was carried for a duration of one year taking up a total of 81 pregnant women admitted or attending the outdoors of Obstetrics & Gynaecology departments in Gauhati Medical College & Hospital, Guwahati.

Selection of Cases: In the present study 81 cases of pregnant women were selected. Amongst them some were Primi gravidae; some were multiparous women with bad obstetric histories like recurrent spontaneous abortion, threatened abortion, missed abortion, intrauterine growth retardation, intrauterine death, congenitally malformed foetus & neonatal death. The clinical presentations of both control and the study group were evaluated according to the clinical history given by the patients.

OBSERVATION AND RESULTS

The results and observations of the present study is tabulated and graphed as follows:

Table 1 Sero-positive cases of rubella in different age group

Age group	Total cases	Percentage of sero positive cases
16-20	10	10
21-30	53	20.8
31-40	18	22.2
SUM	81	53
MEAN	27.00	17.67
SD	±22.869	±6.676
SEM	±13.203	±3.854

For three different age groups, it is seen that the percentage of sero-positive cases of rubella ranges from 10 to 22.2 with a mean value of 17.67, Standard Deviation ± 6.676 and Standard Error of Mean ± 3.854 as evident from **Table 1**.

Table 2 Frequency distribution of the percentage of sero-positive cases

Class interval of age group	Percentage of sero-positive rubella cases	
	f(frequency)	fr(relative frequency)
16 to 20 years	10	0.189
21 to 30 years	20.8	0.392
31 to 40 years	22.2	0.419
Sum	53	1.000

Table 2 shows that highest percentage of rubella cases are found in the class interval of '31 to 40' years with a relative frequency of 0.419 and simple frequency of 22.2. The lowest percentage of rubella cases are found in the class interval of '16 to 20' years with a relative frequency of 0.189 and simple frequency of 10 as evident in **Figure 1**.

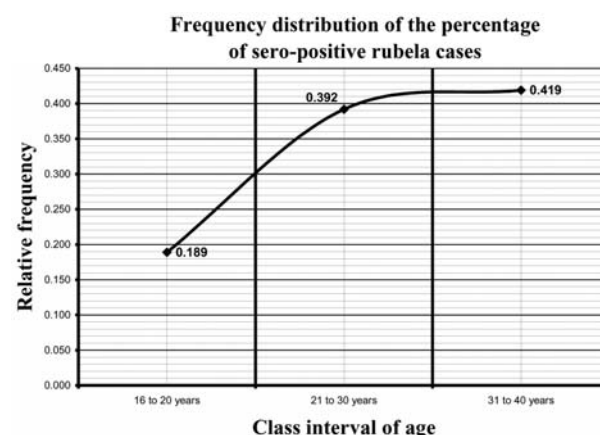


Figure 1 Relative frequency

Table 3 Sero-positive cases of rubella in different clinical presentation

Clinical presentation	Total number of cases	Percentage of sero-positive cases
Pre term labour	30	26.7
Bleeding per vagina	25	8
Still birth	8	25
Spontaneous abortion	5	20
Intra uterine growth retardation	10	30
Asymptomatic	0	0
SUM	78	109.7
MEAN	13.000	18.283
SD	±11.832	±11.800
SEM	±4.580	±4.810

For six different type of clinical presentation, it is seen that the percentage of sero-positive cases of rubella ranges from 0 to 30 with a mean value of 18.283, Standard Deviation ± 11.800 and Standard Error of Mean ± 4.810 as evident from Table 3 and Figure 2.

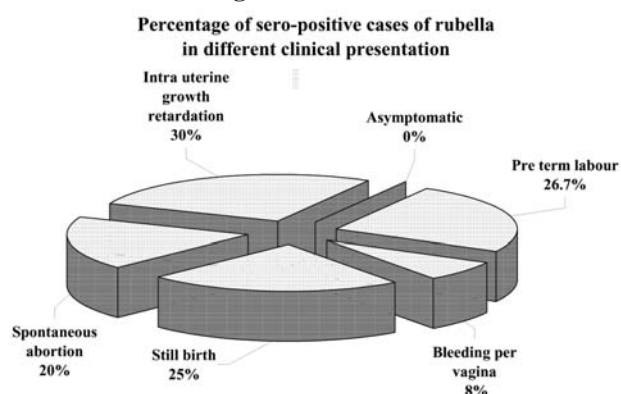


Figure 2 Percentage of sero-positive rubella cases

Table 4 Frequency distribution of the percentage of sero-positive cases

Class interval of clinical presentation	Percentage of sero-positive rubella cases	
	f (frequency)	fr (relative frequency)
Pre term labour	26.7	0.243
Bleeding per vagina	8	0.073
Still birth	25	0.227
Spontaneous abortion	20	0.183
Intra Uterine Growth Retardation	30	0.273
Asymptomatic	0	0.001
Sum	109.7	1.000

Table 4 shows that highest percentage of sero-positive rubella cases are found in the class interval of 'Intra Uterine Growth Retardation' with a relative frequency of 0.273 and simple frequency of 30. The lowest percentage of sero-positive rubella cases are found in the class interval of 'Asymptomatic' with a relative frequency of 0.001 and simple frequency of 0.

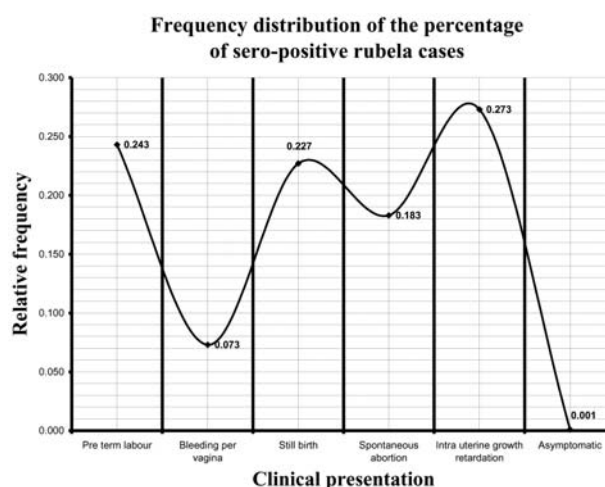


Figure 3 Relative frequency

Table 5 Frequency distribution of the percentage of sero-positive cases

Class interval of socio-economic status	Percentage of sero-positive rubella cases	
	f (frequency)	fr (relative frequency)
IUGR & pre term labour	56.7	0.536
Still birth & spontaneous abortion	45	0.426
Bleeding per vagina & asymptomatic	4	0.038
Sum	105.7	1.000

Table 5 shows that highest percentage of rubella cases are found in the class interval of 'IUGR and pre term labour' with a relative frequency of 0.536 and simple frequency of 56.7. The lowest percentage of rubella cases are found in the class interval of 'bleeding per vagina and asymptomatic' with a relative frequency of 0.038 and simple frequency of 4.

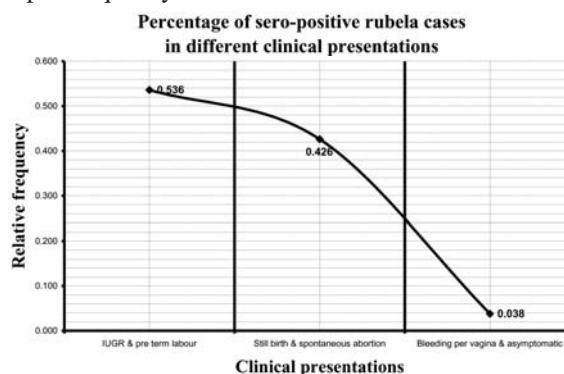


Figure 4 Relative frequency

Table 5 Level of significance of differences between the various categories

Sl. No.	Comparison of mean between percentage of	"t"	P
1	'IUGR & pre term labour' an 'still birth & spontaneous abortion'	1.953	P >0.05
2	'still birth & spontaneous abortion' and 'bleeding per vagina & asymptomatic'	6.684	P <0.01

DISCUSSION

Clinical presentations like IUGR and pre term labour are more in pregnant and non-pregnant women aged 20-40 years in lower economic groups (71.8%) compared with middle and upper socio-economic groups (50%-70%).^{12,13,14} Crowded conditions in lower class population might increase the chances of exposure to rubella infection.¹⁵ A lot of research has been conducted till date on 'rubella virus' in relation to different type of clinical presentations. Most of the studies have concluded that IUGR is one of the commonest presentations of rubella infection and there may be one or more clinical presentation at a time or even asymptomatic. Our study is consistent with this universal observation.

Difference between different type of clinical practice have been measured in matched sets of observation using the null hypothesis: Reject H_0 if $P \leq t_a$ when $t_a = t_{0.05}$ setting the level of confidence at 95% probability signifying that if the differences in observation between the matched groups is significant at the level of $P < 0.05$, the hypothesis will be rejected establishing differences in type of clinical presentation between the tested groups.

CONCLUSION

The present study reveals that the percentage of sero-positive rubella cases is much lower in the age group of '16-20' years than the other two groups i.e. '21-30' years and '31-40' years.

On the other hand, sero-positive rubella cases from highest to lowest percentage in relation to different type of clinical presentation are respectively "IUGR", "pre term labour", "still birth", "spontaneous abortion", "bleeding per vagina" and "asymptomatic". When "IUGR and pre term labour" is compared with "still birth and spontaneous abortion", then the percentage of the first category is higher than the second category, but without any significance ($P > 0.05$). But if "still birth and spontaneous abortion" is compared with "bleeding per vagina and asymptomatic" group, the first category is much higher than the second one with high significance ($P < 0.01$).

So, we can conclude that highest percentage of Rubella

incidence can be found in women of the age of third decade and above and most common clinical presentation are "intra uterine growth retardation" and "pre term labour".

Conflicts of interest: None declared.

Contribution of Authors: We declare that this work was done by the authors named in this article and all liabilities pertaining to claims relating to the content of this article will be borne by the authors.

Ethical clearance: Taken from Institutional Ethical Committee.

REFERENCES

1. Jawaetz, Melnick and Adelberg's Medical Microbiology: Rubella, chapter 40. 27th ed. Singapore: Prentice-Hall International; 2004;23:506-569.
2. Harrison KA. Maternal mortality in developing countries. Br J Obstet Gynaecol 1989;96:1-3.
3. MacLean AB and Cockburn F. Maternal. Perinatal infection. Dewhursts Text book of obstetrics and Gynaecology for post graduates.1995;5:471-493.
4. Miller E, Cradock-Watson JE, Pollock TM. Consequences of confirmed maternal rubella at successive stages of pregnancy. Lancet 1982;2:781-4.
5. Cooper LZ and Krugman S. Clinical Manifestations of Postnatal and Congenital Rubella. Arch Ophthalmol 1967;77:434-9.
6. Cooper LZ, Ziring PR, Ockerse AB, Fedun BA, Kiely B and Krugman S. Rubella- Clinical Manifestation and Management. Amer J Dis Child 1969;11:18-29.
7. Cradock-Watson JE, Ridehalg MKS, Anderson MJ, Pattison JR. Outcome of asymptomatic infection with Rubella virus during pregnancy. J Hyg 1981;87:147-54.
8. Dudgeon JA. Congenital Rubella - A preventable disease. Postgrad Med J 1972;48:7-11.
9. McEvoy GK (Ed). Drug Information 97, American Hospital Formulary Service, American Society of Hospital Pharmacists, Bethesda 1997;1:2645.
10. Robertson SE, Cutts FT, Samuel R, Diaz-Ortega JL. Control of rubella and congenital rubella syndrome in developing countries. vaccination against rubella. Bull World Health Organ 1997;2(75):69-80.
11. Tartakow IJ. The teratogenicity of maternal rubella. J Pediatr 1965;66:380-1.
12. Cooper LZ, Ziring PR, Ockerse AB, Fedun BA, Kiely B and Krugman S. Rubella- Clinical Manifestation and Management. Amer J Dis Child 1969;11:18-29.
13. Seth P, Balaya S, Mohapatra LN. Seroepidemiological study of Rubella infection in female subjects of Delhi and its surrounding villages. Indian J Med Res 1971;59:190-94.
14. Vijayalakshmi P, Anuradha R, Prakash K, Narendran K, Ravindran M, Prajna L, et al. Rubella serosurveys at three Arvind Eye Hospitals in Tamil Nadu, India. Bulletin of the World Health Organization 2004;82:259-64.
15. Yadav S, Gupta S and Kumar S. Seroprevalence of Rubella in women of reproductive age. Indian J Pathol Microbiol 1995;38(2):139-142.

CASE REPORT

Minimally Invasive Beating Heart Mitral Valve Surgery

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ABSTRACT

As techniques in cardiac surgery continue to improve, the minimal invasive approach is providing benefits to the cardiac surgical patient. We report a case of a 24 year old gentleman with diagnosis of rheumatic heart disease with severe mitral stenosis that underwent mitral valve replacement via minimal invasive approach on beating heart. His post operative course was uneventful and he has been on regular follow up now. The advantages and disadvantages of the procedure are discussed here.

Keywords: Heart, mitral valve, thoracotomy

INTRODUCTION

Traditional cardiac surgery generally has been performed through a median sternotomy approach. The development of technique and technology has hastened a shift towards efficient and safe minimally invasive cardiac surgery. Mitral valve surgery is one of the common operations in cardiac surgery field. As understandably, minimally invasive mitral valve surgery has advantages like decreased surgical trauma, postoperative pain, recovery time, and complications related to midline sternotomy are reduced. Several different approaches to the mitral valve has been used – namely partial lower sternotomy or right parasternal approach.¹ Both the approach does preserve all or part of the sternum, but it is essentially the same operation as the transsternal procedure. Yet in another approach, the surgeon can reach the heart through a right thoracotomy through the 3rd or 4th intercostal space.² Again unlike in conventional mitral valve surgery where heart is arrested with cardioplegic agent at the time of surgery, a beating heart mitral valve surgery can be performed employing certain technique and understandably with certain benefits. We describe a case in which we performed mitral valve replacement using an approach via a limited right thoracotomy on beating heart.

THE CASE

This 24 year old gentleman felt exertional breathlessness. On evaluation he was found to have severe mitral stenosis with mitral valve area 0.7 cm², mean mitral valve gradient of 16 mmHg with subvalvular fusion.

He was taken up for mitral valve replacement via right thoracotomy approach and on beating heart. The position of patient on table was kept supine with right thorax elevated with small pillow below the right scapula and chest. A 7-8 cm skin incision was made at mammary line

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and thoracotomy was performed via right anterior 4th intercostals space. Cardiopulmonary bypass was initiated with aortic and bicaval cannulation, and systemically cooled to 28 °C (**Figure 1**). An aortic root vent needle was inserted and connected to vent sucker at 100 mmHg. The patient was placed in the Trendelenburg position. Patient's perfusion pressure was kept at 70 mmHg. Heart rate was maintained between 70-80 beats per minute, and right atrium was opened.



Figure 1 Rt anterior 4th intercostal space approach & on cardiopulmonary bypass

One drop-in suckers was placed in the left atrium to maintain a bloodless operative field. Handheld retractor was used to expose the mitral valve (**Figure 2**). Anterior mitral leaflet excised, complete preservation of posterior mitral leaflet and submitral apparatus was done to maintain left ventricular geometry. A 27 ATS Medtronic prosthetic valve was seated. Rewarming was started at the time of tying the valve sutures. Prosthetic mitral valve leaflet mobility was checked. Deairing of left side of heart performed. The right atrium was closed using a standard technique.



Figure 3 Intracardiac structures after opening of right atrium

Came out of cardiopulmonary bypass in normal sinus rhythm. Two right ventricular temporary pacing wires were put as standard protocol. Thoracotomy wound was closed in layers with intercostals drains in situ (**Figure 3**). The postoperative course was uneventful. His postoperative echo cardiogram showed normally functioning prosthetic mitral valve with normal left ventricular function. The patient discharged on 6th postoperative day.



Figure 3 Closing the minithoracotomy surgical wound

DISCUSSION

The first description of minimal invasive mitral valve surgery (MIMVS) did come from Navia and Cosgrove in the mid 1990s.¹ Since then various minimally invasive approaches for mitral valve have been reported including the parasternal, hemisternotomy, minithoracotomy and totally endoscopic approaches with a common goal of all these approaches is to avoid median sternotomy related limitations or complications.²

Beating-heart surgery is performed without stopping the heart. The circulation of blood to the heart muscle continues during the operation. Surgery on a stopped heart is common. The heart is stopped for surgery and blood to heart is reintroduced to restart the heart again. This is called reperfusion. Reperfusion can cause impairment of heart function due to ischemia-reperfusion injury. Reperfusion injury can be avoided if the heart is kept beating during surgery.

The clinical rationale for this 'mini' approach is to improve outcomes in valve surgery as small incisions are being used to decrease pain and trauma, improved postoperative respiratory function, reduce blood transfusion, reduced period of hospital stay and less costly, while providing the same quality of surgery. More over the patient

satisfaction is improved, since they are able to return to work and normal activity is faster.³ Again MIMVS has comparable long term efficacy in measures like freedom from reoperation and long-term survival compared to standard surgery.² The most common minimally invasive approach to the mitral valve is a right minithoracotomy.⁴ The incision is made along the 4th intercostals space. The incision extends from the parasternal border from 7 to 10 cm laterally. The mitral valve is positioned in the center of the incision although the surgical field is smaller than a median sternotomy.²

The pericardium is entered, and antegrade aortic and right atrial cannulation is performed. Patient is put on cardiopulmonary bypass and systemically cooled to 28°C to reduce metabolic demands to heart and other organs.⁵ Keeping the ventricles empty and decompressed helps in endomyocardial coronary perfusion.⁵ An aortic vent needle is inserted at aortic root. The left atrial approach to reach the mitral valve is common. When the left atrium is small, extension of the atriotomy over the dome of the left atrium provides an improved exposure.¹ When transseptal septal approach to mitral valve is chosen then both superior and inferior vena cava is cannulated separately. The inferior vena cava canula can be inserted through a different hole in lower intercostals space to increase the area of working field. This hole latter can be used for placement of intercostal drain.

The surgical field is set once patient is on cardiopulmonary bypass, then meticulous plan for final stage of operation to be carried out. When right atrial approach is chosen, it is opened after caval tapes were put down, isolating the right atrium. A few important steps to be kept in mind in this tricky and technically demanding operation. The most important stage is once the atrium is opened, it might suck air and lead to immediate massive systemic embolisation. To avoid that patient is kept in Trendelenburg position so that cerebral embolisation is minimised if at all it happens, keep the surgical field flooded with carbondioxide so that CO₂ embolus will get absorbed slowly, aortic root vent on optimum suction at 100 mmHg, control the patient's heart rate at around 70-80 beats/min and systemic blood pressure around 70 mmHg.^{4,5} The left ventricular cavity should be kept filled with blood from the level of tip of mitral valve leaflets. A vent sucker put in left atrium to keep the surgical field dry through an opening in the junction of right superior pulmonary vein and left atrium. The mitral valve is examined and anterior mitral leaflet is excised.

Decalcification and release of fibrotic adhesion is done. The mitral subvalvular apparatus is preserved by reattaching it to mitral annulus. The posterior mitral leaflet is completely preserved. The preservation of mitral subvalvular apparatus is vital to maintain normal left ventricular geometry and function. A prosthetic mechanical valve is seated at mitral annulus. Rewarming is started while the surgeon ties valve sutures. Valve leaflet movement checked, left side of heart deaired and atrium is closed. Patient is repositioned, came out of cardiopulmonary bypass after putting two temporary right ventricular pacing wires for any post operative intervention if needed. The thoracic wound is closed in layers after keeping two intercostals drain, one in pericardial cavity and another in pleural cavity, temporarily.

The primary concern of minimal invasive mitral valve surgery is the incidence of neurological complications due to its possible technical limitations for adequate de-airing.⁵ But in a systemic metaanalysis of 6 eligible studies by Seeburger et al. found no significant difference in neurological events.⁶ A reduction in postoperative transfusion requirements is a potential advantage as significant morbidity and mortality associated with transfusions and reexploration for bleeding is minimised.⁵ Again the comparative studies of conventional approach and minimal invasive mitral valve surgery on mortality, no study has showed a significant difference in mortality between the two approaches.² Mihaljevic et al. showed the perioperative mortality is 0.2% for the minimally invasive group and 0.3% in the sternotomy patients. Grossi et al. found 3.7% vs. 3.4% mortality between patients undergoing minimally invasive and conventional approach mitral valvesurgery.⁷

Who are candidates for this procedure? Patients with isolated aortic or mitral valve disease, and in some cases double valve disease, are the candidates for this procedure.⁸ There are a few reports on isolated right coronary artery bypass grafting surgery along with this procedure.³

CONCLUSION

Our experience in North East Indira Gandhi regional Institute of Health and Medical Sciences (NEIGRHIMS) and other eligible literature has shown the feasible alternative to the conventional full sternotomy approach to mitral valve surgery. There is a slight learning curve, but once mastered, these techniques are no different in context of amount of time needed in the procedure. There

is less perioperative morbidity; recovery is faster and cost effective. We believe that MIBHMVS is just a step in the evolution toward more minimally invasive cardiac surgical techniques that will further enhance outcomes of patients with valvular heart disease. Also this technique is excellent for atrial septal defect closure and we have been performing this operation by this technique in our institute regularly.

Conflict of interest: None declared.

Consent from patient for publication: Taken.

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REFERENCE

1. Navia J Land Cosgrove D M. Minimally invasive mitral valve operations. *Annals of Thoracic Surgery* 1996;62(5):1542–1544.
2. Lucà Fabiana et al. Minimally Invasive Mitral Valve Surgery: A Systematic Review. *Minimally Invasive Surgery* Volume 03/2013;2013(1):1-10.
3. Cohn Lawrence H. Minimally invasive valve surgery. *J Card Surg* 2001;16:260–5.
4. Iribarne A, Karpenko A, Russo M J et al. Eight-year experience with minimally invasive cardiothoracic surgery. *World Journal of Surgery* 2010;34(4):611–615.
5. Michael R Petracek. Minimally Invasive Mitral Valve Surgery without Aortic Cross-Clamping. *Texas Heart Institute Journal* 2011;38(6):701–702.
6. Seeburger J, Borger MA, Falk V et al. Minimal invasive mitral valve repair for mitral regurgitation: results of 1339 consecutive patients. *European J of Cardio-Thoracic Surgery* 2008;34(4):760–765.
7. Grossi EA., LaPietra A, Ribakove GH et al. Minimally invasive versus sternotomy approaches for mitral reconstruction: comparison of intermediate-term results. *J of Thoracic and Cardiovascular Surgery* 2001;121(4):708–713.
8. Mihaljevic T, Cohn LH, Unic Det al. One thousand minimally invasive valve operations: early and late results. *Annals of Surgery* 2004;240(3):529–534.

CASE REPORT

A Rare Case Report of Extra Medullary Hematopoiesis in Lung in a Case of Thalassemia

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ABSTRACT

In thalassemia ineffective red cell production by the bone marrow (ineffective erythropoiesis) forces expansion of the hematopoietic tissue outside the marrow medulla and leads to hematopoietic compensatory involvement, mostly in the form of masses, of other regions in the body, the phenomenon termed extramedullary hematopoiesis (EMH). So ineffective erythropoiesis in patients with thalassemia drives extramedullary hematopoietic tumor formation in several parts of the body. EMH is most often seen in reticuloendothelial organs like spleen, liver or lymph node and rarely seen in lung parenchyma. Here, we are reporting a case of 32 yrs male presented with the complain of fatigue, pallor, breathlessness, with history of β thalassemia, diagnosed as EMH in lung. Computed Tomography (CT) of chest showed bilateral masses at the lower lobe of both lung. The masses initially diagnosed as neoplastic lesion radiologically. CT Guided fine needle aspiration cytology of the mass confirms pulmonary extramedullary hematopoiesis.

Keyword: Extramedullary hematopoiesis, myeloproliferative disorders, myelofibrosis

INTRODUCTION

Extramedullary haematopoiesis is a response to insufficient blood cell production by production of blood elements outside the bone marrow.¹ Extramedullary hematopoiesis is most often seen in reticuloendothelial organs specially spleen, liver, or lymph nodes, and it is rarely seen in lung parenchyma.² Almost all reported cases of pulmonary extramedullary hematopoiesis occurred following myeloproliferative disorders specially myelofibrosis.³ Other less common underlying causes are hemolytic anaemia, hereditary spherocytosis, thalassemia syndromes, other hemoglobinopathies, etc.⁴

Thalassemia was defined as a clinical entity in 1925 by Dr. Thomas B. Cooley at the annual meeting of the American Pediatric Society where he presented five young children with severe anaemia, splenomegaly and peculiar bone abnormalities.⁵ The β -thalassemias are a group of autosomal recessive disorders characterized by absence or reduced synthesis of the red cell β -globin chains. As a group, they are the most common single gene disorder in the world and are found at high frequencies in many populations worldwide.⁶ Extremely diverse phenotypes exist within the homozygous and compound heterozygote states for β -thalassemia. The terms thalassemia major (TM) and thalassemia intermedia (TI) lack specific molecular correlates, but encompass a wide spectrum of clinical, as well as laboratory abnormalities.⁷ At the severe end of the spectrum are patients whose clinical course is characterized by profound anemia, who present to medical attention in the first year of life, and who subsequently require regular transfusions for survival, the condition known as TM.⁸ But many patients with inheritance of two mutant beta alleles have a milder illness, with a broad

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range of severity including, at least in early childhood, a virtually asymptomatic state. Patients in this group who present to medical attention in later childhood and remain largely transfusion-independent are said to have TI.² However, transfusion-independence in TI does not come without its own side effects. Ineffective red cell production by the bone marrow (ineffective erythropoiesis) forces expansion of the hematopoietic tissue outside the marrow medulla and leads to hematopoietic compensatory involvement, mostly in the form of masses, of other regions in the body—the phenomenon termed extramedullary hematopoiesis (EMH).⁹ So, ineffective erythropoiesis in patients with thalassemia drives extramedullary hematopoietic tumor formation in several parts of the body.

Among the various body regions reported, lung involvement is very rare.¹⁰ Intrathoracic EMH is a rare condition that is often located in the posteroinferior mediastinum and is usually asymptomatic. Clinically, it is important to distinguish masses caused by EMH from other lesions involving the posterior mediastinum.

Intrathoracic EMH, particularly posterior mediastinal EMH, is a rare condition that was first described during an autopsy in 1912.¹¹ The majority of Intrathoracic EMH masses are usually asymptomatic and can be found by microscopic examination, however, occasionally they lead to tumor-like masses, as presented in the current case. Furthermore, Intrathoracic EMH may cause serious complications, including a massive hemothorax, symptomatic pleural effusion, chylothorax or spinal cord compression.¹²⁻¹⁴ As the manifestation is variable, it is difficult to distinguish EMH from other mediastinal tumors, mainly when the underlying hematologic disease is as yet undiagnosed. For posterior mediastinal masses, such as those identified in the present case, neurogenic tumors, lymphomas, paravertebral abscesses, extra pleural cysts, primary and metastatic malignant neoplasms and mediastinal lymph node hyperplasia must be considered in the differential diagnosis of Intrathoracic EMH.¹⁵

Pathophysiology of extramedullary hematopoiesis

Extramedullary hematopoiesis is a physiological compensatory phenomenon occurring because of insufficient bone marrow function that becomes unable to meet circulatory demands. Almost all body sites may be involved including the spleen, liver, lymph nodes, thymus, heart, breasts, prostate, broad ligaments, kidneys, adrenal glands, pleura, retroperitoneal tissue, skin, peripheral and cranial nerves, and the spinal canal.¹⁰ These

sites are believed to normally engage in active hematopoiesis in the fetus during gestation. This pathway normally stops at birth, but the extramedullary hematopoietic vascular connective tissues retain the ability to produce red cells under conditions of longstanding ineffective erythropoiesis.⁸

It is usually unnecessary to treat patients with TEMH, with the exception of symptomatic patients. Since extramedullary hematopoietic tissue is highly radiosensitive at relatively small doses, radiotherapy has been indicated to be an effective method for controlling symptomatic spinal cord compression and hemothorax, while surgical treatment is reserved for immediate symptomatic relief. It has also been reported that the surgical resection of EMH may cause further deterioration of anemia and promote hematopoietic behavior in other areas. Therefore, it is important to determine a correct pre-operative diagnosis to avoid unnecessary surgical trauma and improve prognosis.

Here, we are reporting a 32 year old male with history of thalassemia presented with extramedullary hematopoiesis in lung.

CASE HISTORY

A 32 yrs male with history of thalassemia presented with the complain of fatigue, pallor, breathlessness. Chest examination revealed mild wheezing in both lung regions and decreased breath sounds at both the lung base.

Laboratory tests: The whole blood count showed a hemoglobin level of 8 g%, a red blood cell count of $3.8 \times 10^{12}/l$, a mean corpuscular volume of 84.6 fl, a mean corpuscular hemoglobin level of 30.1 pg, a total leukocyte count of $5.3 \times 10^9/l$ and a platelet count of $180 \times 10^9/l$. Peripheral blood smear showed microcytic

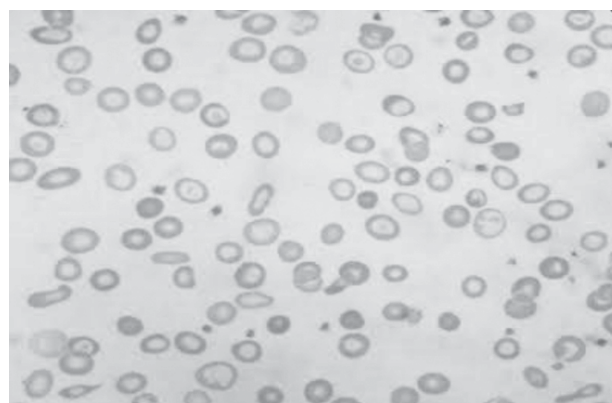


Figure 1 PBS shows hypochromic anemia and target cell

Chest X-ray and contrast-enhanced Computed Tomography of chest showed bilateral masses resembling neoplastic lesion at the lower lobe of both lungs. The size of the masses is (11 x 13) cm on the right side and (13.5 x 15) cm on the left side respectively. With the presumptive diagnosis of malignancy fine needle aspiration under guide of CT was performed.

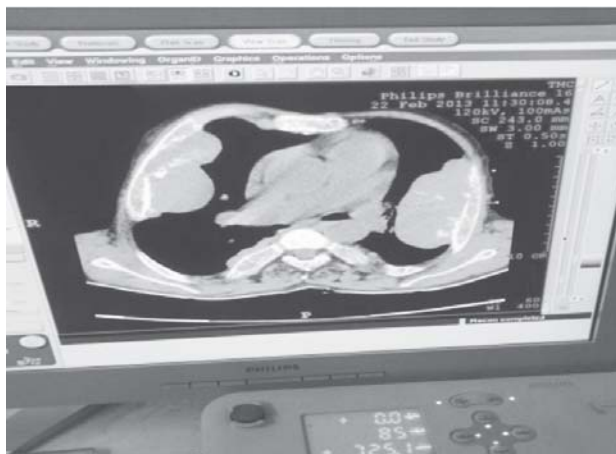


Figure 2 Contrast-enhanced CT of chest showed large mass at the lower lobe of both lungs

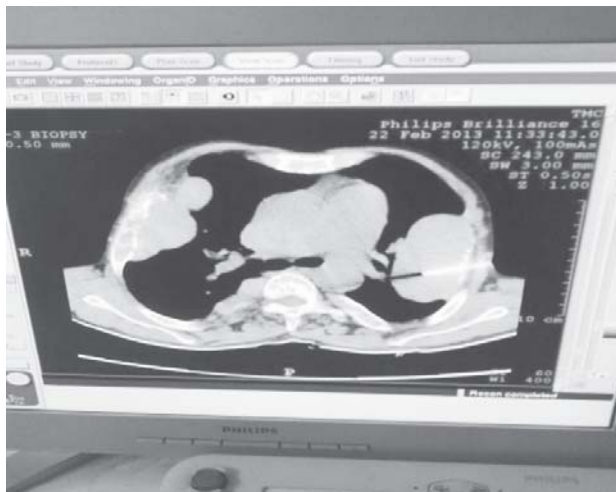


Figure 3 CE CT shows needle inside the mass

The smears were subsequently stained using routine MGG stain. The microscopic examination revealed hypercellular smears composed of islands of erythroid precursors, myeloid series (**Figure 4**), and some mature and immature megakaryocyte (**Figure 5**), thus confirming extramedullary hematopoiesis.

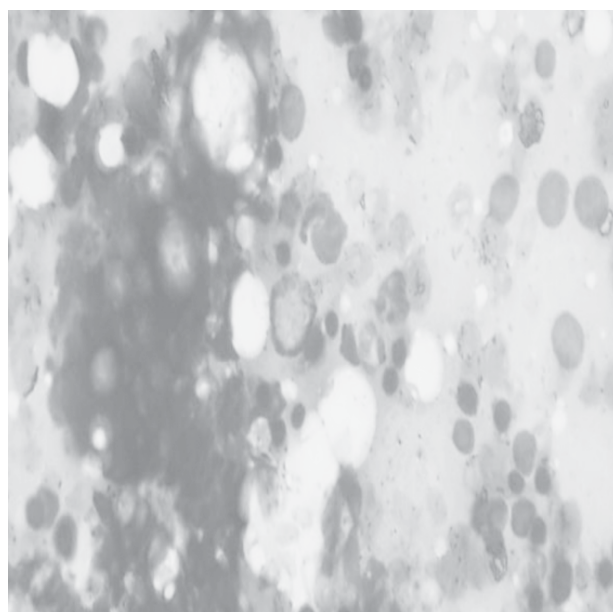


Figure 4 FNAC shows hyper cellular smear composed of islands of erythroid precursors and cells of myeloid series

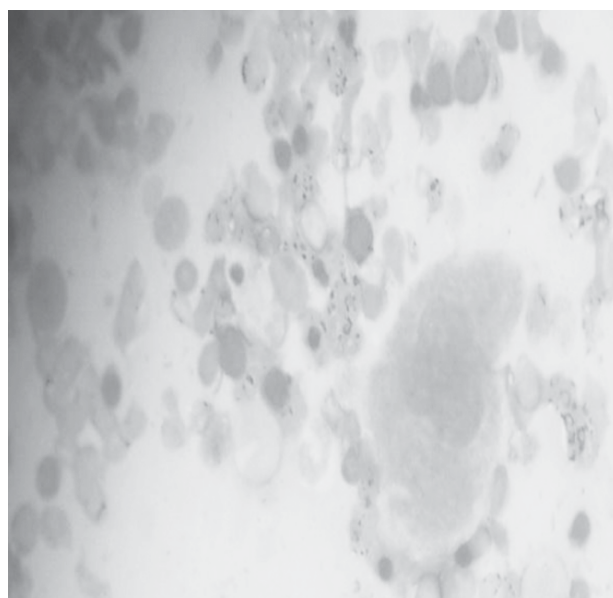


Figure 5 Megakaryocyte in FNAC smear

DISCUSSION

Morteza Hassanzadeh reported a case with beta-thalassemia intermedia who had undergone splenectomy presented with pulmonary extramedullary hematopoiesis.⁹ Kumar et al. reported a case of pulmonary extramedullary hematopoiesis presented with lung mass which was diagnosed by fine needle aspiration cytology.⁴ In another

study Hsu et al. explained a case of extramedullary hematopoiesis mimicking metastatic lung carcinoma. The patient presented with a left lower lobe lung carcinoma and left pleural masses, initially thought inoperable metastatic disease radiographically but fine needle aspiration of pleural masses revealed extramedullary hematopoiesis.⁵ Pandit et al. in another study showed the significance for mobilization of hematopoietic progenitor cells in allergic inflammation localized in the lung parenchyma of asthmatic patients. The progenitor cells are mobilized from bone marrow and migrate to lung parenchyma.⁶

CONCLUSION

Extramedullary hematopoiesis of lung parenchyma can be mistaken for lung neoplasm radiologically. By performing CT guided FNAC the definite diagnosis of pulmonary extramedullary hematopoiesis in a case of thalassemia was made. A correct diagnosis can thus aid in avoiding unnecessary surgical intervention, particularly in an asymptomatic patient. Although previous reported cases occurred with myelofibrosis, we are reporting the rare case of thalassemia associated extramedullary hematopoiesis in lung.

Conflict of interest: No conflict of interest associated with this work.

Declaration of author: Due consent was taken.

REFERENCES

1. E. Rumi, F Passamonti, E Boveri, M De Amici, C Astori, M Braschi et al. Dyspnea secondary to pulmonary hematopoiesis as presenting symptom of myelofibrosis with myeloid metaplasia. *American Journal of Hematology* 2006;81(2):124–7.
2. Weatherall DJ, Clegg JB. The thalassemia syndromes. Osney Mead, Oxford: Blackwell Scientific Publications; 2001.
3. Taher A, Ismaeel H, Cappellini MD. Thalassaemia intermedia: an update. *Mediterr J Hematol Infect Dis* 2009;37:12–20.
4. PV Kumar, M Arasteh, A Musallaye, M Hakshanash. Fine needle aspiration diagnosis of extramedullary hematopoiesis presenting as a right lung mass. *Acta Cytologica* 2000;44(4):698–9.
5. FI Hsu, DA Filippa, H Castro Malaspina, RJ Downey. Extramedullary hematopoiesis mimicking metastatic lung carcinoma. *Annals of Thoracic Surgery* 1998;66(4):1411–3.
6. TS Pandit, MR Hosseinkhani, BN Kang, N S. Bahaie, Xiao Na Ge, S P Rao et al. Chronic allergen challenge induces pulmonary extramedullary hematopoiesis. *Experimental Lung Research* 2011;37(5): 279–90.
7. Krouwels FH, Bresser P, von dem Borne AE. Extramedullary Hematopoiesis: Breathtaking and Hair-Raising. *N Engl J Med* 1999;341:1702–4.
8. Weatherall DJ. Thalassaemia: the long road from bedside to genome. *Nat Rev Genet* 2004;5:625–31.
9. Morteza Hassanzadeh. Extramedullary Hematopoiesis in Thalassemia. *N Engl J Med* 2013;369(13):1252.
10. Tsitouridis J, Stamos S, Hassapopoulou E, Tsitouridis K, Nikolopoulos P. Extramedullary paraspinal hematopoiesis in thalassemia: CT and MRI evaluation. *Eur J Radiol* 1999;30:33–8.
11. Haidar S, Ortiz-Neira C, Shroff M, Gilday D, Blaser S. Intracranial involvement in extramedullary hematopoiesis: case report and review of the literature. *Pediatr Radiol* 2005;35:630–4.
12. Guangbin Zhu, Xiaomei Wu, Xuelin Zhang, Meiyu Wu, Qingsi Zeng, Xinchun Li. Clinical and imaging findings in thalassemia patients with extramedullary hematopoiesis. *Clinical imaging* 2012;36(5):475–82.
13. Tantawy AA, Adly AA, Mahdy SA, Kamel GZ. Spinal cord compression and extramedullary hematopoiesis in young Egyptian beta-thalassemia patients. *Hemoglobin. Intl J for hemoglobin research* 2009;33(6):448–62.
14. Castelli R, Graziadei G, Karimi M, Cappellini MD. Intrathoracic masses due to extramedullary hematopoiesis. *Am J Med Sci* 2004;328:299–303.
15. Bo Zhou, Sheng Yan and Shusen Zheng. Intrathoracic extramedullary hematopoiesis mimicking intrathoracic tumors: A case report. *Oncol Lett* 2014;7(6):1984–6.

CASE REPORT

Cut Throat Injury: Homicidal or Suicidal? Crime Scene Visit Solved the Mystery

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ABSTRACT

A cut throat injury is mostly homicidal in nature. Often in homicide, bodies are found at remote places. In the present case a dead body was found in a sulabh souchalaya (public common toilet) with injury over neck. The door was semi closed due to victim's legs. Police got access to body after removal of door. Body was brought for post-mortem to government medical college Mumbai.

On autopsy examination a single incised cut throat injury of size 17x2 cm was found over anterior part of neck without hesitation cuts. All neck structures were severed. Which gives the first impression of homicide. Hence, one visit was arranged to the crime scene. Findings of crime scene and information obtained during police investigations clarifies complete picture. It was concluded as a case of suicide.

Cut throat injury without hesitation cuts is rare in suicidal deaths. As this is an uncommon case an attempt is made to arrive at the conclusion of causation of injuries and manner of death by detailed autopsy examination and crime scene visit and examination which gives idea about nature of crime, thus helps crime investigations.

Keywords: Cut Throat Injury, Homicide, Hesitation Cuts, Crime Scene, Suicide

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INTRODUCTION

Cut throat injury is incised injury over the neck, inflicted by sharp elements such as razor, knives, broken bottle pieces, glasses etc. which may be homicidal or suicidal or accidental. In case of cut throat injury there is high chance of injury to blood vessels. Death occurs due to (1) Profuse haemorrhage (2) Air embolism (3) Inhalation of effused blood. In right handed individual, the wound is marked by multiple separate tentative or hesitant cuts at the beginning and the main cut usually begins from upper part of antero-lateral aspect of left side on neck. But a determined suicide may inflict a big gapping incised wound severing completely the soft tissues of the front of neck down to the vertebral column. Absence of struggle and resistance, presence of other self inflicted injuries, evidence of suicidal intent and detection of suicidal note, etc. will point towards suicide.¹

A cut throat injury is mostly homicidal in nature. Many times in homicide, bodies are found at remote places. Suicidal incised wounds are found most commonly over the neck and are usually associated with hesitation cut wounds. The other features of self-inflicted injuries lie in the multiple, predominantly parallel nature of the wounds and, in suicidal acts; the more superficial injuries are referred to as 'hesitation' or 'tentative' injuries.² Suicidal incised wounds on the neck are usually, but not always, accompanied by hesitation marks.³

REVIEW OF LITERATURE

An incised injury over neck has special importance of its own, because of its situation and circumstances relating to it. The distinction of importance is usually between suicides or homicide, as a cut throat injury is rarely

accidental. Infliction of cut throat injury is a well recognised method of committing suicide, although the incidence has lessened much recently for less use of open razors for shaving. Light sharp cutting weapons like knife, razor blades are commonly used for the purpose. Common site of selection is upper part of neck, above the level of adam's apple.¹

Marak FK had reported one suicidal case of cut throat injury in which they found one incised wound on the left side of the neck elliptical in shape, measuring 14 x 3.5 cms in size, with red clean cut margins involving right neck muscles, vessels and thyroid cartilage. Two parallel obliquely placed subcutaneous deep incised wound (hesitation marks) was present on the right sided neck, situated 3 cm below the angle of the mandible, measuring 8 cm in length and 0.2 mm in width with clean cut margins.⁴

Suicide by incising one's own throat without hesitation marks remains rare, and only few cases have been reported in the forensic literature. Shetty SK presented one atypical suicidal cut throat injury without hesitation cuts.⁵

CASE REPORT

An unknown body was found in a Sulabh Souchalaya (public common toilet) with injury over neck. Police considered is as a case of murder, or sodomy with murder, as the body of the unknown male was found in toilet. Weapon used for murder was kept to side of body. Finger prints present over knife were taken by expert. His clothes were stained with blood. Pool of blood was seen around body. Identity of deceased was established from his driving licence found in his pocket. Police transferred body to Govt. medical college and hospital's post mortem centre. Deceased was a 37 year old hindu male moderately built and moderately nourished, cold body. Rigor mortis was well developed and generalised in upper and lower limbs. Post mortem lividity was present over back and it is fixed. Eyes and mouth were open, dry blood stain trickled from left angle of mouth downwards. Drt dark red blood stains were present over anterior neck and the chest.

EXTERNAL EXAMINATION

- 1) Incised cut throat injury of size 17x2 cm present over anterior part of neck in midline above the level of thyroid cartilage and cavity deep. Margins are sharp and clean cut.
- 2) Incised wound of size 0.4x0.1 cm present over right thumb palmer aspect of proximal aspect.



Figure 1 Margins are sharp and clean cut without hesitation cuts



Figure 2 Incised wound over right thumb

INTERNAL EXAMINATION

On dissection of neck skin, soft tissue, muscles including platysma and sternocleidomastoid on both sides were cut, larynx at third tracheal ring, oesophagus, and deeply situated carotid sheath jugular veins and carotid arteries on both sides of neck were sharply cut. Dried dark red coloured blood was seen in lumen of trachea.

Abdominal wall was intact and no free fluid in peritoneal cavity noted. Internal organs were intact and pale. Spine and spinal cord was intact with no injuries.

No under scalp injuries, no fractures of skull vault. Brain and dura was intact, brain was soft and oedematous.

Thoracic wall was intact with no rib fracture, both lungs were intact, pale and oedematous. Heart was normal in size and shape and no abnormality detected.

Cause of death given was "Haemorrhage and shock due to cut throat injury."

(Un-Natural). Samples were preserved for chemical analysis.

OBSERVATIONS

A team of forensic expert visited the crime scene after receiving a call from police. The door was semi closed due victim's legs. Police got access to body after removing door. Deceased was lying in supine position with knees semi flexed and folded towards right side, and both arms were semi flexed. One knife and a pair of chappals (footwear) were found near body of deceased.



Figure 3 Unknown body with injury over neck and pool of blood seen around it



Figure 4 Weapon used for causing injury shows blood stains

Measurements of crime scene were as follows. The latrine was of 5 feet length x 2.5 feet breadth & 7 feet height. Door of latrine did not have locking handle from inside. The knife found near victim's legs had blood stains. The knife was of 25cm length, whose blade was of 14 cm length and 11cm wooden handle and 2cm in breadth.

Pool of blood was seen around the body in toilet. The latrine did not have a bucket inside to use. No other blood stains or other imprints were present at crime scene outside the room. The imprints stained with blood did not come out of the latrine. A bicycle was found outside the sulabh soughhalaya.



Figure 5 Blood stains or imprints not coming out of toilet

DISCUSSION

Cut throat injuries are not uncommon in our country. It was difficult task for a forensic expert to differentiate it into suicidal, homicidal or accidental case. In present case the measurements of toilet room and above all findings it was assumed that size of latrine was small so it was difficult to enter more than one person at a time. The imprints stained with blood not seen coming out of the latrine means no one came out of toilet. The latrine does not have bucket inside to use, so the deceased has not gone for using toilet. The incised wound was a single and without hesitation cuts. The knife was having very sharp edge on one side (inner) and blunt on other side (outer). It was possibility that deceased had incised his throat with sharp cutting edge.

Kundu RK in their study of cut throat injury cases found 40 (66.7%) out of total 60 cases were due to suicidal injury and 13 out of total (21.7%) were due to homicidal injury. Only 7 (11.6%) cut throat were due to accidental injury. Regarding anatomical site (Zone) of the neck involvement, 9 cases (15%) were zone I involvement, 44 cases (73.3%) were zone-II involvement and 7 cases

(11.6%) were zone III.⁶ Bhattacharjee reported twenty-six patients (13 males and 13 females) with cut throat injury were studied, and found 11 had suicidal, 11 homicidal and 4 accidental cut throat injuries.⁷

CONCLUSION

Police investigations found that the knife found at crime scene was a kitchen knife of deceased residence. Police also found that he was a right handed person and not left handed. It was possibility that the deceased held the knife in his right hand and incised his throat with sharp cutting edge. He was much determined so firmly held knife at junction of blade and handle to apply maximum force and strength to take incision over neck, while doing so he injured his right thumb. The bicycle found outside the sulabh soughhalaya (public toilet) the belonged to deceased. All the findings noted at crime scene were in favour of the possibility that deceased had committed suicide by cutting his throat.

HISTORY

History about deceased during police investigations revealed that deceased came to Mumbai from Kerala where a rape case was registered against him. Presently he was working in a idliwadasamber stall and transferred goods by his bicycle. He was residing with his co-workers at his owner's room. He was under depression from few days as stated by his owner in his statement given to police.

REFERENCES

1. Mukharjee JB, editor Karmakar RN. Forensic Medicine and Toxicology, 4th ed. Kolkata (India): Academic publishers; 2011. p. 322-3.
2. Shepherd R. Simpson's Forensic Medicine. 12th ed. London (UK): 2003. p. 68-9.
3. DiMaio VJ, DiMaio D. Forensic Pathology. 2nd ed. Wahington DC (US): CRC press; 2011.
4. Marak FK, Singh B. Suicidal cut throat - A case report. JIAFM 2005;27(4):260-2.
5. Shetty SK, Padubidri JR, Bhandarkar AM, Shetty AJ, Shetty M. Atypical suicidal cut throat injury – A case report. Journal of Forensic and Legal Medicine 2009;492-3.
6. Kundu RK, Adhikary B, Naskar S. A clinical study of management and outcome of 60 cut throat injuries. J Evolution of Medical and Dental Sciences. 2013;2(49):9444-52.
7. Bhattacharjee N, Arefin SM, Muzumdar SM, Khan MK. Bangladesh Med Res Conc Bull 1997;23(3):87-90.



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